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## Making the Ford Motor Car

Foundry, Heat Treatment and Machine Operations of a Remarkable Plant with Special Reference to the Apportioning of Work to the Operatives\*

BY O. J. ABELL

The Ford Motor Company, Detroit, has scheduled for its new plant the building of 75,000 automobiles during the present year. At the time of this writing the record of building 500 cars in one day has been reached. As an example of the economic and physical requirements of manufacturing in such quantities, the operations for the Ford factory are, *prima facie*, spectacular. But behind the remarkable spectacle of this number of finished cars rolling out under their own power to the shipping platform every day moves a dominating singleness of purpose which has made



First Ford Factory

both the organization and manufacturing details strikingly consistent. A proper appreciation of the workings of this plant, even in a purely technical sense, must recognize in the selection of raw materials, in the specialization of manufacturing processes and in the simplicity of design an essential peculiarity. For the far-reaching and finely discriminating sense of what things are essential and for the pervading influence which keeps the organization constantly directing its entire effort toward the accomplishment of these things credit is entirely due to Henry Ford.

In a period of less than nine years a business has been developed which now demands manufacturing capacity for a product totaling over \$30,000,000 annually. This remarkably rapid expansion has necessitated manufacturing under continually changing conditions. At the present time a new machine shop, a new four-story building for general manufacture and assembly, more than doubled power facilities and additions of 200 feet each to the heat treatment and foundry buildings are in process of erection or completion. Other new buildings are already projected. New machinery is being purchased, the aggregate value of

which is estimated at \$275,000. The manner of conducting the manufacturing processes is accordingly the more striking, and particularly so in view of the large number of single pieces and distinct operations involved. It is pointedly apparent that success, as it has been exemplified in this company's manufacturing problem, has demanded more than an adjustment of the elements of time and material to a quantity scale of operations, and has required a recognition of the human element in production to an unusual degree.

The restriction of the company's product to a single model chassis was a matter of development to which at least three influences contributed: First, the study of alloy steels together with their proper heat treatment from which the design adopted has been made possible. Second, a remarkably far-sighted recognition of the magnitude of the market for a low-priced car. Third, the advantage and the necessity, from a manufacturing standpoint, of adhering to a single product if the quantity demanded by the market was to be produced at a minimum selling price with a satisfactory profit.

The experiments of the Ford Motor Company to determine that particular steel or alloy which would best withstand the stresses of automobile service, and at the same time would lend itself most suitably to being worked

up into finished parts in the shop, have extended through several years and have been made without regard to expense. Exhaustive tests of various steels have been made from heats of metal in which the percentage of each element in the steel was varied through a minimum to maximum range. Data were obtained sufficient to establish the complete characteristics of carbon steel and the several alloys under investigation.

Solely upon the basis of what such tests have proved has a vanadium alloy steel been chosen. Similar laboratory investigations as to the effects of heat treatment have been made and are being prosecuted continuously. It has been demonstrated that if the conditions of heat treatment are really maintained constant, absolutely uniform results may be obtained with indefinite repetition. In the



Fig. 1—One of the Shipping Platforms

\*The production system and the notable power plant to be described in next week's issue.

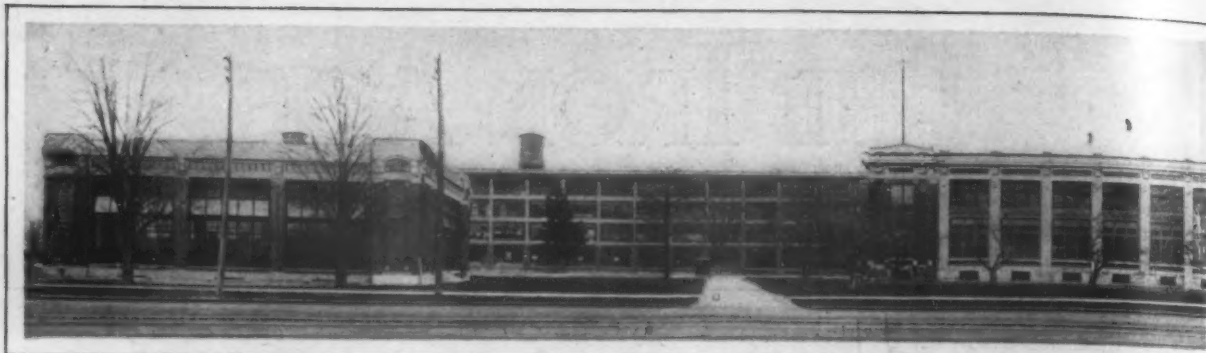


Fig. 2—View of the West Front of the Works of

Ford method of testing, the physical record of each piece of steel is paralleled with a micrographic record of its structure. This plan has been carried out to an extent such that if under treatment a particular steel structure is obtained as shown by the micrograph, the corresponding physical qualities of strength and elasticity can be assumed with accuracy. This is the keynote of Ford heat treatment. In the laboratory the ideal condition of the steel is shown by tests of its physical characteristics. The microscopic structure of the steel in that condition is then determined. Then setting aside completely the laboratory data and experimental conditions, the same microscopic structure is obtained in the shop under practical conditions with commercial equipment and handling arrangements. This done, the physical properties are found to be identical with those of the laboratory tests.

It remains to preserve in the shop absolutely constant conditions of time, temperature and exposure to treatment. At the Ford plant all heat treatment has been reduced to a unit basis of time and temperature per pound of metal, under constant furnace conditions. Each automobile part is especially treated in accordance with experimental records, to resist the particular stress upon it. Crank shafts are heat treated to resist impact, gears to resist wear, front axles to resist vibration, rear axle shafts to resist torsion. Every forging used, however unimportant, is subjected to suitable heat treatment. The reductions in the weights of parts as shown by actual comparison of the present and previous models and made possible by the facts developed, are almost startling.

The Ford plant is laid out and equipped to meet the requirements of but one proposition—the building of the one model of car. The location and arrangement of the vari-

ous manufacturing buildings, the plan of which is shown in Fig. 4 and the cross-section in Fig. 3, have taken their present form in part because of the necessities arising out of an expansion so rapid that new buildings were outgrown before they were occupied. The building construction in general is of reinforced concrete skeleton for the four-story sections, and steel supporting columns on the machine-shop floors, carrying saw-tooth roofs at one story high. The nature of this construction is indicated in the cross sectional elevation. The foundry and heat treatment buildings, as well as the power and heating plants, are steel frame structures and are isolated units in the building plan, but the remainder of the buildings are continuous, covering an area approximately 860 ft. long and 820 ft. deep.

This ground floor area of more than 700,000 sq. ft. is bisected by a craneway 56 ft. 6 in. wide, spanned by a 5-ton Case crane and extending from the receiving platforms at the north end of the buildings to the assembly and testing floors at the opposite end. In general all of the heavier pieces, whether purchased from outside plants or received from the Ford foundry or heat treating departments, are unloaded directly into this craneway by means of the crane and either in bins or floor space are given temporary storage pending delivery to the machine shop. This craneway is, therefore, the main distributing artery of the plant. On each side of the craneway are the machine shops with a combined floor area of more than 330,000 sq. ft. This includes a floor space 180 ft. x 260 ft. in the new portion of the machine shop now being completed for the pressed steel department, which is to be moved from Buffalo to Detroit.

The pressed steel department is traversed by a secondary craneway marked No. 2 on the general plan, Fig. 4, and spanned by a 5-ton Shaw crane which will serve heavy presses arranged in two rows beneath it. The central machine shop area is enclosed on three sides by four-story buildings, the ground floors of which are essentially continuous with the machine-shop floor. The four-story building on the west side will be used entirely for storage, although at present the main floor is used for assembling and portions of the other floors are devoted to auxiliary manufacturing operations. These latter will be transferred to the new four-story building on the east side, and to an extent the upper floors of this building will also be used for stock. The ground floor will be the main car assembly floor.

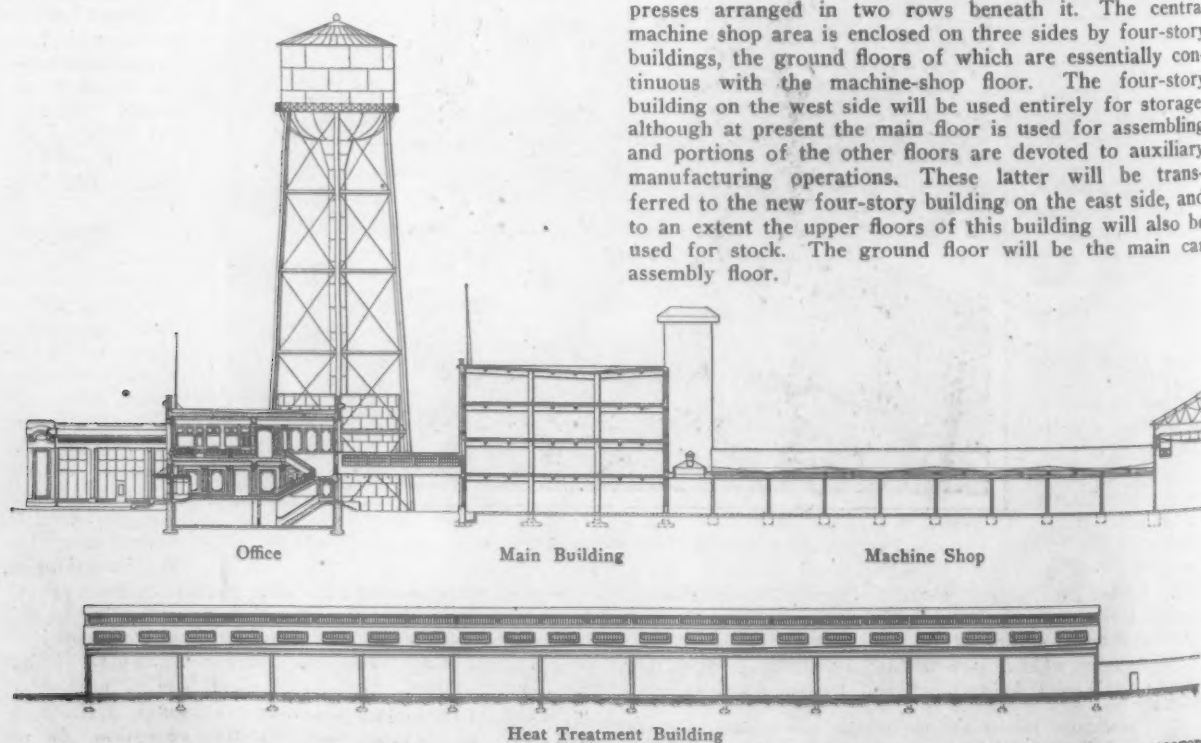
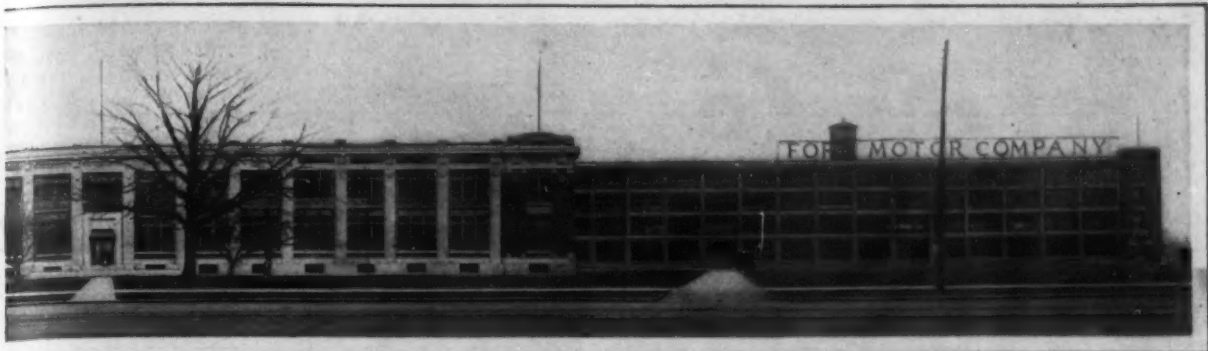


FIG. 3—SECTIONAL ELEVATION OF THE FORD MOTOR



the Ford Motor Company, Detroit, Mich.

The present arrangement of the plant provides for the incoming material tracks and receiving platforms at the north end paralleling the foundry, heat treatment buildings and the gas power and heating plants. From a point alongside of the heat treatment building and extending eastward for a length of 718 ft., as shown in Fig. 4, is a continuous sand and storage bin structure of reinforced concrete. Provision is made for a runway along the top of this bin structure on which will be mounted a gantry crane with cantilevers overhanging on both sides. On the one side of the bins the crane will span the incoming material tracks and on the opposite sides the distributing tracks and receiving platforms for the foundry and heat treatment buildings. A direct transfer is thus afforded.

The bins are designed with open tops so that material may be handled in or out directly from the gantry cranes. The bins also have side openings where the materials stored are parts requiring more protection than the open top would permit. For handling materials between the various departments of the plant, an overhead trolley system, part of which is already installed, is being extended with sufficient ramification over all of the floor space as to reduce trucking of material to an absolute minimum. These trolleys consist of a traveling cage with a 2-ton Sprague electric hoist trailer hung on I-beam runways. The material is carried either in the steel barrels and trays shown in the various illustrations or on flat platforms. The operations of this plant are on such a scale that pur-

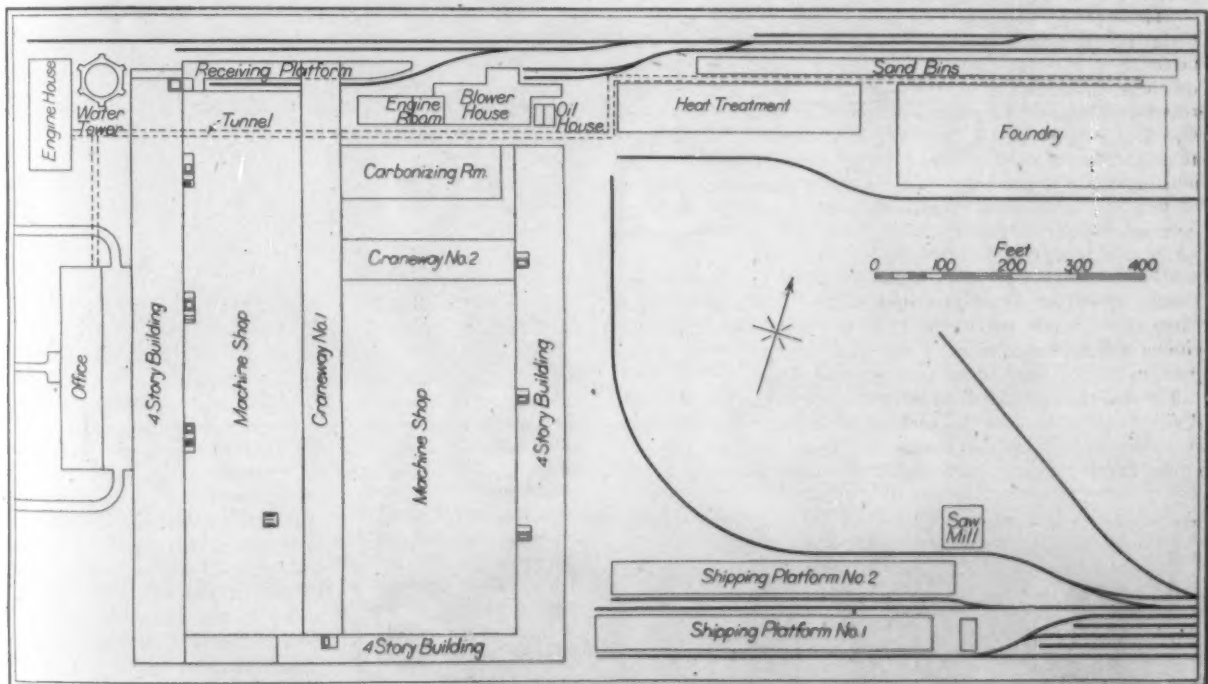


Fig. 4—General Plan of the Works of the Ford Motor Company

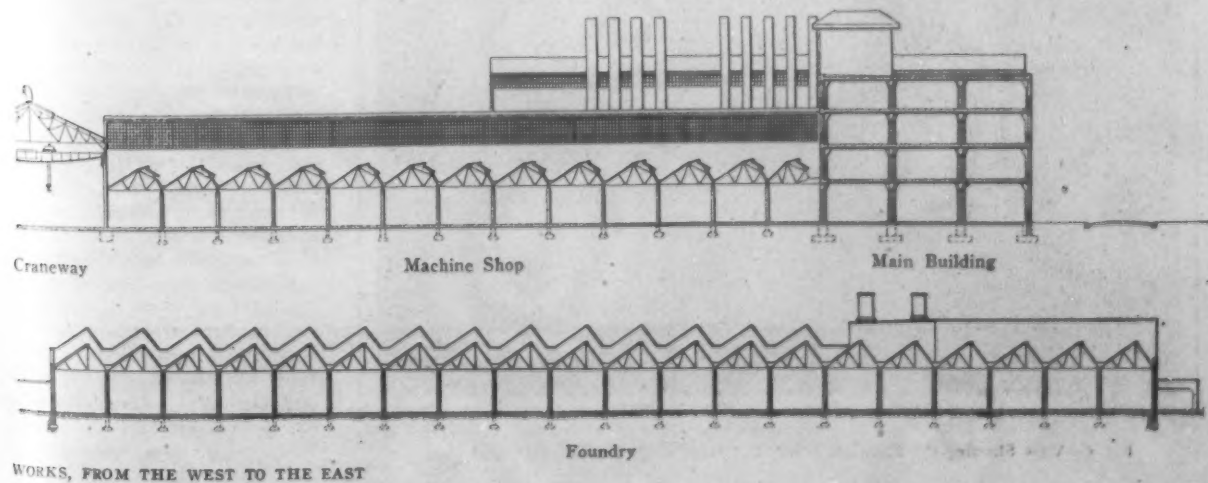






Fig. 5—A General View of the Foundry Pouring Floor, Showing the Roof Structure and Artificial Lighting

chases of material, even the smallest parts, are restricted to carload lots almost without exception, and in consequence, the subsequent distribution of this material through the manufacturing processes becomes a handling problem of unusual magnitude.

The present foundry building is 201 ft. long x 148 ft. wide, but is being extended to a length of 401 ft. The building is of steel framework with a saw-tooth roof and includes in addition to the foundry floor, a large core room and sand-mixing room on one side, and on the opposite side the chipping, grinding and rumbler department for the cleaning of castings. The foundry molding and pouring floor is between. The melting equipment consists of two No. 60 Newton cupolas built by the Northern Engineering Works, Detroit. All of the molds are machine made, the equipment consisting of 29 machines, including squeezers of the Berkshire Manufacturing Company's type, Pridmore rollout machines, and Killing Molding Machine Company rollover machines. For the most part these machines are arranged around the wall preserving the major portion of the floor space as a pouring floor.

The operations involved in making the molds are subdivided so as to give to each man a single specific task. A helper cleans up the flasks, one man operates the machine, another helper carries over the cope and drag to the

of piling the molds for pouring. An ordinary day's output includes the making of 74 cylinder flasks, 700 brake-shoe flasks, 150 piston-ring molds, each mold containing four pots 7 in. long; 350 piston molds, each containing four pistons; 200 cylinder-head molds and other parts in proportionate numbers. This rate of production, unusual as it may seem, falls considerably behind the production rate in other departments of the plant.

The sand-mixing room is immediately back of the cupolas and is so arranged that sand may be brought from the bins by the gantry crane and discharged directly into elevator hoppers located above the sand mixers. These sand mixers are placed on a mezzanine floor at sufficient height so that steel sand buggies may be placed below. The mixed sand then drops by gravity into these buggies to be hauled either to the molding machines or the core room. Pneumatic shakers for riddling the sand are bracketed on the wall with sufficient space between so that the sand buggies can be backed in to be filled.

The general arrangement of the core room is shown in Fig. 9. The coremakers' benches are arranged along the sides at right angles to the walls and each operator makes but one core continuously. Steel core molds are used, and in this respect, as in every other department, particular effort is directed toward the making of accurate castings.

It is the intention to use such methods, molds, jigs and gauges throughout in the making and finishing of all parts that variations in the car parts as they come to the assembly floor will be absolutely eliminated and the assembly operations will at no time involve fitting work. At one end of the core room are six Byram & Co. core ovens for small cores. These ovens are fronted by a steel rack. The cores are placed on this rack for inspection and patching. Two men handle this work exclusively. Four other men handle the cores in and out of the ovens. At the opposite end of the room are four car ovens. A transfer track traverses the oven front and the core-car tracks extend across the core-room floor providing for the handling of the larger cores.

The heat treatment building is of steel frame single monitor type construction 72 ft. wide and with the new addition 363 ft. 4 in. long. In the present building 17 furnaces are in-



Fig. 6—View Showing the Floor on Which Cylinder Molds are mounted and poured



stalled of the type shown in Fig. 7, which furnace is also used for the carbonizing treatment. These furnaces are arranged in two rows back to back with passage-way between. The furnaces are oil burning with two burners on each side as shown in the illustration. The pyrometer is inserted in the middle of the furnace back at the point where the furnace floor and back wall meet. In general the heat treatment process requires at least four consecutive heating and cooling operations, but each furnace has an individual formula for the various classes of work.

For quenching, a low-type open-top rectangular tank car is installed carrying the quenching solution. This car operates along a track immediately in front of the furnaces. The cars are fitted with a discharge spout through which the quenching solution can be drained into a conduit under the floor and from there pumped up to cooling tanks on the roof on the building, whence it is returned through piping to be used again. Heavy wire baskets fit into these cars arranged with a bale and hook to permit handling from an overhead trolley above the track.



Fig. 8—Device for Building Up Cooling Radiators. The Tube Sheets Are Placed in a Form and All the Tubes are Inserted in One Operation

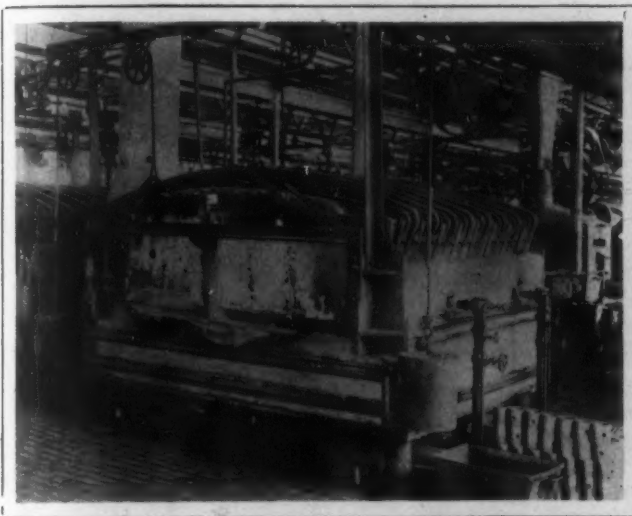


Fig. 7—View of the Type of Furnace Used for Heat Treatment of Forgings as Well as for Carbonizing Treatment

In this manner the heated forgings can be raked out of the furnace directly into the quenching cars, the solution drained off, the basket lifted and dumped wherever desired.

In the heat treatment building opposite the furnaces test gauges are mounted. Every forging is tested for warp after treatment and the distortion is corrected. Each workman handles only one particular forging and with the repetition work a surprising skill is attained in gauging the corrective effort necessary to bring the forging back to true. The forgings are ground to remove fins and burrs and are finished in tumbling barrels. For the heavier work on the forgings two Morgan Engineering and two Erie Foundry steam hammers are installed.

The carbonizing room is a part of the main group of buildings and is 80 ft. 8 in. wide and 240 ft. long. In addition to the provisions for treating gears, crank and cam shafts, valve stems, mag-

neto magnets and similar parts, this department includes a blacksmith shop for miscellaneous work and the babbiting pots. For the hardening work requiring the packing of the parts in sealed boxes with a carbonizing compound,—for example, gears,—oil burning furnaces of the type shown in Fig. 7 are used. Of these there are four. For the other work where the immersion method is employed cyanide furnaces are installed.

It is a common fault in connection with the carbonizing of steel in sealed boxes that the pieces, removed from the boxes while hot are immediately quenched to avoid oxidation and as a result the structure of the core of the piece is seriously injured. The Ford process cools the piece in the box before unsealing. The piece is then heated again, not high enough to induce oxidation, but sufficiently to set the exterior. After cooling it is again heated to make the core fibrous and again a fourth time to establish the desired toughness and ductility. Each succeeding temperature is lower than the preceding, and the previously established conditions are therefore undisturbed.

The heat control is recorded with electrically



Fig. 9—General View of the Foundry Core Room Showing the Coremakers' Benches at the Left and the General Handling of Core Racks in the center of the Floor



Fig. 10—General View in the Machine Shop from the Assembly End, Showing How the Bays are Numbered

operating pyrometers and clocks. For graphically recording the time and temperature schedule for each furnace a circular dial chart has been devised on which the day is divided into suitable periods upon which the furnace operator records the consecutive temperature treatments. In conjunction with this record and as a check upon it a system of signal lights is installed recording the operation of the furnaces.

As an example of the division of labor in this department the making of the bar magnets for the magneto may be cited. These magnets, which are V-shaped, were formerly drop-forged, but now are made from bar stock. These bars are heated in a continuous furnace which delivers direct to a bull-dozer equipped with a cutting off and a bending set of dies.

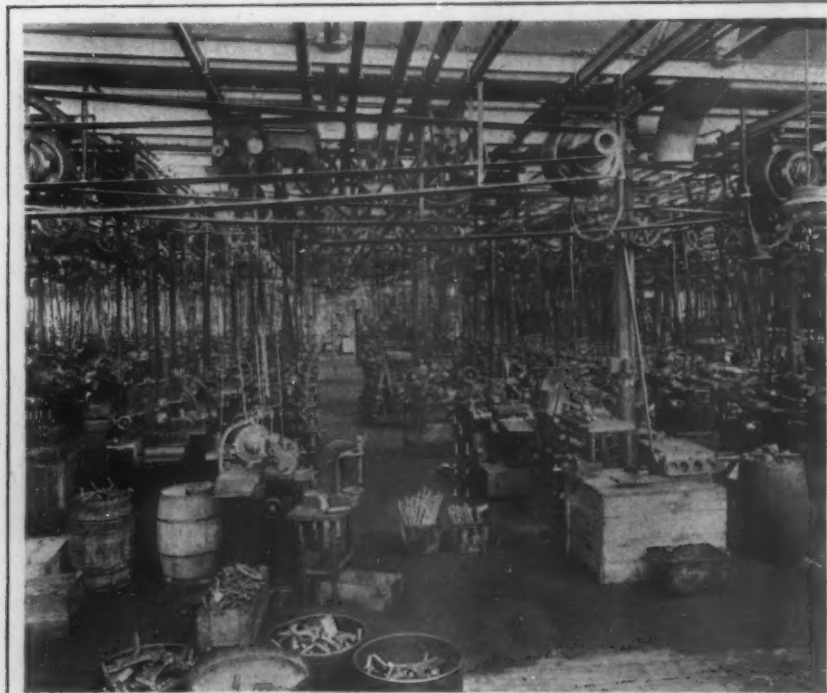


Fig. 11—General View of the Machine Shop Grinding Department

One operator feeds the bars into the furnace, a second feeds the bar into the bull-dozer for the cutting off operation, a third takes the piece of bar and inserts it for the bending operation and returns the bent piece into a re-heating furnace, a fourth operator handles the furnace and passes the reheated piece to a punch press operator who puts a finishing boss on the magnet. The punch automatically kicks the piece out into a tray. Two cyanide furnaces are arranged with a quenching bath between, each having an individual operator and the one bath taking the output of the two hardening furnaces.

Of the various departments of the plant the machine shop is perhaps the most striking. At the time of writing only half of the machine shop floor is being operated, the new portion still being too incomplete to permit installing machines. The machine shop is



Fig. 12—Motor Testing Rpm. In the New Arrangement for Testing, the Motors will be Connected to Generators and Run Under Load, at the Same Time Developing Current

spectacular in its general appearance because of the large floor space and because of the extent to which every available foot is taken up with machines. The group plan of belt drive from overhead motors is responsible for a mass of belting which contributes further to the general maze. Fig. 11 illustrates this general spectacle. This crowded condition has been unavoidable rather than desirable and the handling of material with sufficient freedom has been possible only because the materials at the machines are limited to a maximum of two days' supply when they are requisitioned from stock and because the demand for material from each succeeding department is so continually insistent as to prevent accumulation. From a psychological standpoint the resultant close proximity of the machine operators and bench workmen is interesting as a preventive of intercommunication between them.



It is now an established experience that men working so near each other that they may communicate without effort run the gamut of what each may have to convey to the other with astonishing quickness, and accordingly lose all interest in conversation. Where there are obstacles to continuous conversation, there temptation is.

In keeping with the remarkable economy of floor space the orderly arrangement, in groups, of the principal machining operations, is the interesting feature of the shop layout. This grouping is illustrated in Figs. 6 to 11 and most of the remaining pictures. At the north end of the shop the first general operations consist of the roughing cuts and grinding to finish the crank and cam shafts. Fig. 11 is a view of more than 90 Norton & Landis grinding machines. A similar group of Potter & Johnson lathes is installed for

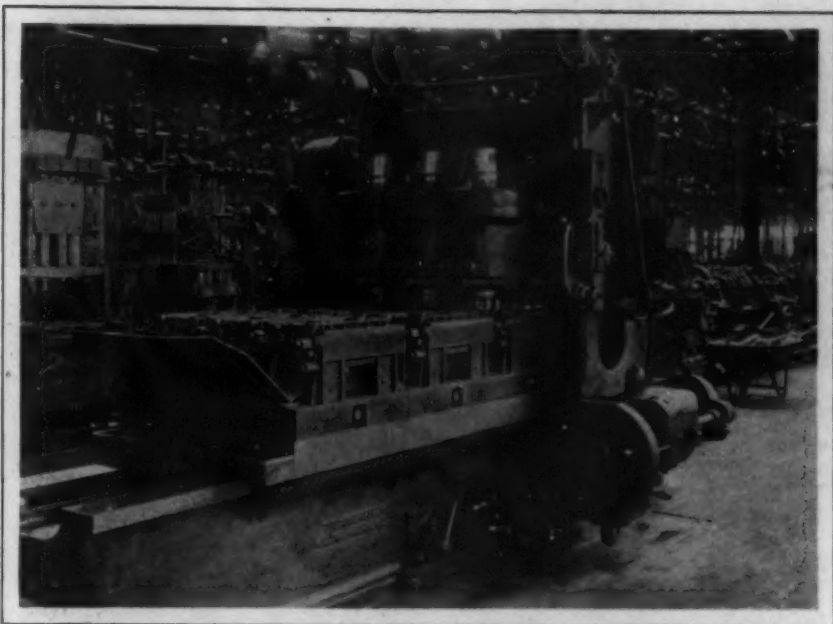


Fig. 14—Typical Set-Up of Cylinders for Surfacing on a Milling Machine

and the work is done. The length of time required is almost absurd in the light of ordinary practice, but some notion of the economy may be obtained from the fact that the four-cylinder casting, fully machined and ready for installation in the car, is regularly catalogued among the repair parts at \$24.

Fig. 16 shows another portion of the cylinder finishing floor. As indicated the cylinders are mounted on the turning lathes in pairs. Beyond this section the surfacing of the cylinders is done in milling machines of the type illustrated in Fig. 14. This particular machine was furnished by the Ingersoll Milling Machine Company and the milling operation is continuous, the operator setting up the pieces at one end while those at the opposite end are being finished. Both cylinders and crank cases are machined in this manner.

The bolt and stud department is illustrated in Fig. 19, which shows a part of the group of 61 National-Acme automatic screw machines. The saving of floor space as a result of the diagonal placing of



Fig. 13—Gang of Five Multiple Drilling Machines Arranged for Consecutive Operation on the Cylinder

finishing the pistons and piston rings. The adjoining group of over 100 upright and sensitive drilling machines for miscellaneous drilling is illustrated in Fig. 15. All the work for these machines is jigged and the same pieces go to the same machines and operators continuously. The cast-iron work follows, and in Fig. 13 is shown a gang of multiple drilling machines on which consecutive operations on the cylinders are finished in sequence.

Fig. 17 presents a new multiple drill designed by the Foote-Burt Company, Cleveland, for the Ford cylinders. The machine is arranged to drill four sides of the cylinder, finishing 45 holes simultaneously. The cylinder is jigged into position, the operator throws the starting lever, the machine is equipped with automatic stop and reverse, the operator takes the cylinder out

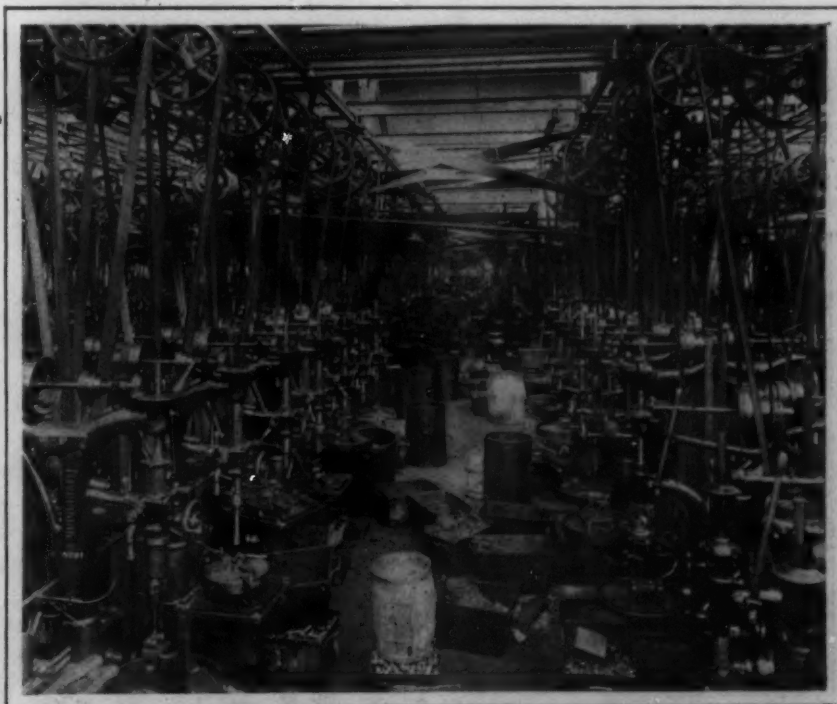


Fig. 15—A Part of the Drilling Machine Department





Fig. 16—Machine Shop Section in Which the Cylinders and Crank Cases Are Machined

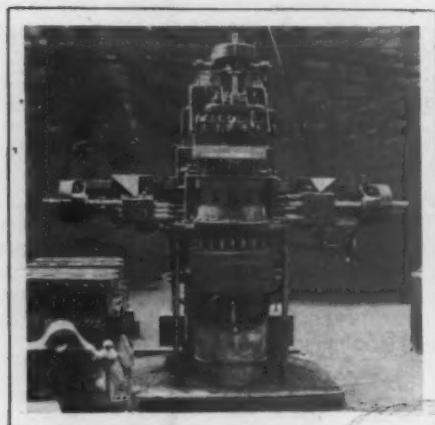


Fig. 17—Multiple Drilling Machine, Drilling 45 Holes Simultaneously



Fig. 18—One of the Unique Features of the Plant in Its Provision for Toilet Facilities



Fig. 19—Part of the Group of Automatic Machines for Making Bolts, Studs and Parts

the machines is considerable as compared with a right angle arrangement. The gear cutting group of machines is shown in Fig. 20 and consists of 16 Gould & Eberhardt gear cutting machines on which the gear blanks are gashed out and 18 Gleason gear generating machines on which the gear teeth are finished. The Gleason machines are in the foreground and the gear cutting machines immediately behind. Fig. 21 shows a group of 17 Fay Machine Tool Company automatic lathes and on the left a row of five Browne & Sharpe and 10 Barber-Coleman horizontal spindle milling machines.

The various groups are arranged in the general scheme and with respect to one another in a manner intended to reduce the handling of material to a minimum and to make the various finishing operations follow consecutively in one direction. The general motor assembly

floor toward which the movements of the major portion of the machined parts converge is shown in Fig. 23. Just as the general scheme of the plant is unique, so are many individual machining operations and machines. Duplication of the methods employed would require similar conditions of quantity output and duplication of parts. A feature of the machine shop available for any factory however is illustrated in Fig. 18. This is an enclosed toilet mounted on concrete supports. Over it is a motor-driven suction fan which exhausts through the roof transoms above. The conspicuous approaches, the ventilation and light, and the fact the floor space below remains available for ordinary usage, are notable advantages.

(To be continued.)

Tests of a 300-hp. Diesel oil engine with an equipment to utilize the heat of the exhaust gases in two water heaters of

about 325 sq. ft. of heating surface were reported by J. Cochand and M. Hottinger, in the *Zeitschrift des Vereines deutscher Ingenieure*. It is stated that as much as 80 per cent. of the heat contained in the fuel may be usefully employed.

One effect of the six-day basis of working in the steel industry is shown by the experience of a blast-furnace plant in the Central West. Since the beginning of the year, when about 500 men were employed, there have been as many as 584 new hands taken on. About 50 per cent. of those in the employ at the beginning of the year have remained, showing that there have been repeated changes among the others since that time. The laborers in this case are of the class who come to this country to make as much as possible in as short a time as possible, and they go where they are allowed to work the seven

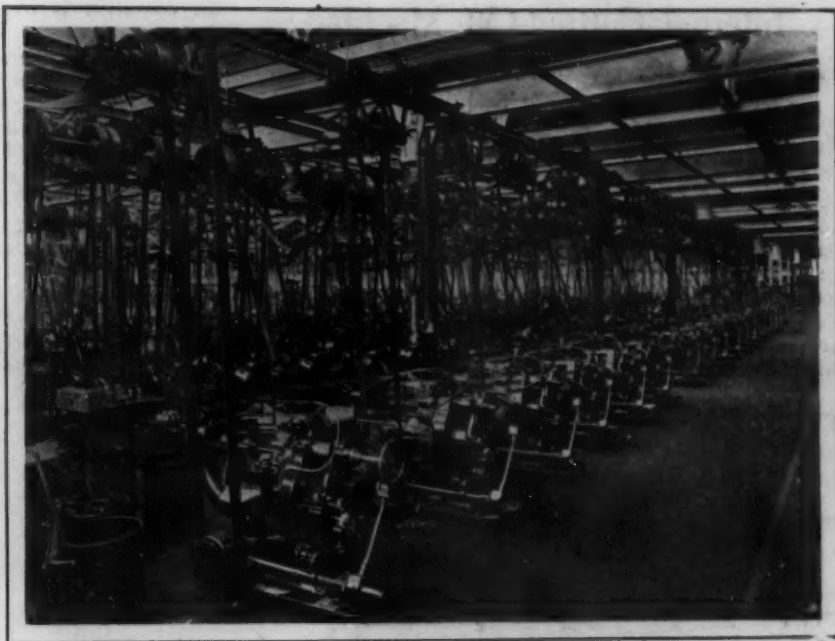


Fig. 20—A Group of Gear Cutting and Gear Generating Machines



Fig. 21—Group of Automatic Lathes and Milling Machines for Finishing Small Gears

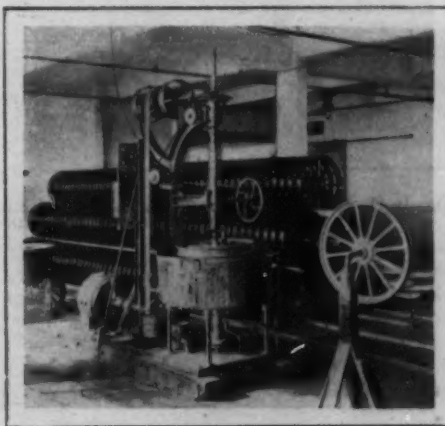


Fig. 22—Boring Machine Arranged for Painting Wheels

days of the week. In the steel plant of the same works the employee, however, has seemed satisfied with the diminished remuneration because of the holiday secured.

The babbitt metal generally used on the Russian Southwestern railroads is, according to a translation made from a Russian bulletin by the American Society of Mechanical Engineers, made of 23 per cent. tin, 3 per cent. gun metal, 24 per cent. antimony and 50 per cent. lead. Tests were made with the usual babbitt and one containing 83 per cent. lead and 17 per cent. antimony with results as follows: The usual babbitt, with a specific gravity of 8, showed a hardness of 23, a toughness of 18.1 and a strength of 34, while the new babbitt, with a specific gravity of 10, showed a hardness of 20, a toughness of 17.5 and a strength of 31. The wear of bearings was found to be practically equal, but the new babbitt costs but half.



Fig. 23—The General Floor Section for the Assembly of Motors

## Internal Cutting-Off Machine

### Economy of Power, Increased Production and Reduced Cost, Three Special Features of a New Newton Machine

In designing its new 5-in. high production internal cutting-off machine, the Newton Machine Tool Works, Inc., Twenty-fourth and Vine streets, Philadelphia, Pa., had in view the construction of a machine which should be first of all a special purpose manufacturing tool intended for square cuts on solid sections and nothing else. Some of the special features claimed for this machine are increased production coupled with a decrease in the cost of turning out the work, and an economical power

the operation is completed and thus injuring the saw blade.

The body of the saw blade is 26 in. in diameter and the opening between the tops of the teeth is 7 in., thus giving a capacity for stock up to a maximum diameter of 6 in. The worm wheel driving the barrel to which the saw blade is attached is approximately 38 in. in diameter and has 8-in. pitch teeth. The saddle has a very broad bearing in the base, the overlocking gibs being fastened solid with the base and the adjustments are made by taper shoes to prevent the possibility of chatter. The circular bearings in the saddle are 28 in. in diameter and lubrication is secured by annular oil grooves. When operating at the very high rate of feed of which this machine is capable the heat developed would be sufficient to draw the temper from the saw teeth if it were not for the

fact that the machine is amply provided for delivering sufficient lubricant to dissipate this heat. As there is a possibility of the lubricant coming in contact with the bearings, felt pads shown at L, Fig. 3, and located on both sides of the saddle and cap are employed for protection. The base of the machine acts also as a reservoir from which the lubricant is pumped and to insure its return ample troughs such as are shown at M are cast solid with it.

Although prolonged tests indicate that this machine in operation under actual shop conditions consumes only about 5 hp., to provide against accident the drive will be by a General Electric RCL 201 frame 20-hp., form A, 230-volt motor running at 500 to 1000 r.p.m. The motion is transmitted from the motor to the driving pulley by an 8-in. double chrome tanned leather belt. The pulley on

the armature shaft is 15 in. in diameter and that on the driving spline shaft is 30 in. in diameter. The diameter of this latter shaft upon which the driving worm wheel is mounted is  $2\frac{1}{4}$  in. For the feed and fast traverse motion is taken from the end of the driving spline shaft at N, Fig. 3, and carried to the spur gears at O for the power quick return. It is then transmitted through the gear box P, giving six changes of geared feed to the feed worm wheel Q, Fig. 1, which runs free of the feed screw, as does also the friction clutch R, which gives the fast traverse. The different motions are engaged and disengaged mechanically by a clutch operated by the arm S or by hand through the lever T. When starting the cut the trip U is set to release the arm S at any predetermined point and the trip V also engaging with the arm forms a positive release for the power quick return. The hand wheel W, Figs. 2 and 3, provides a means of adjustment for the saddle.

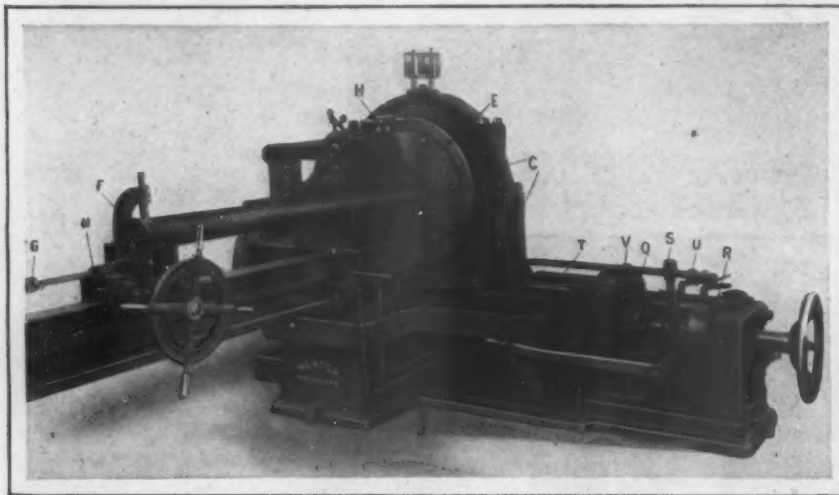


Fig. 1—Operating Side of a New 5-In. Internal Cutting-Off Machine Built by the Newton Machine Tool Works, Inc., Philadelphia, Pa.

consumption. In this machine the periphery drive is employed and feeds from three to five times greater than previous records are maintained with a power consumption that is very low. A view of the operating side of this machine is given in Fig. 1, while an end view and one of the driving side are reproduced in Figs. 2 and 3 respectively.

The spindle equivalent consists of a hollow cylindrical casting, A, Fig. 2, having a double bearing, B, in the saddle and the cap C, Fig. 1. The large diameter worm wheel was applied at D, Fig. 2, and this in turn is driven by a hardened steel worm wheel having roller thrust bearings mounted in the bottom of the saddle with which it travels. In this way it is pointed out that the periphery drive is successfully applied and enables all parts having opposed stresses to be so placed that the bearings are in a common casting. The face of the drum driving the saw blade is counter-bored at E, Fig. 1, for the reception of the internal inserted tooth saw blade manufactured by the Tabor Mfg. Company, which has an accurate peripheral fit to the drum that insures both being concentric.

In operation bars up to 16 ft. in length are placed with one end clamped in the stock trolley F, and moved forward a sufficient distance to permit the rough end to be cut off. The adjusting stop G is then placed a distance equal to the length of the finished piece desired plus  $9/16$  in., which is the width of the saw blade. After the truing cut is completed the saw carriage is returned to the starting position and the stop G coupled with the forward stop shown in front of the clamp in Fig. 3 is adjusted until it comes in contact with the point H, Fig. 1. The carriage is then moved forward until contact is made with the forward stop, thus locating the bar for the exact length. When this has been completed the clamping screw I is adjusted by hand until it touches the work, and the actual clamping is then accomplished by the lever J, which controls the air supply. The independent adjustment of the screw I is necessary to accommodate varying diameters of stock. An auxiliary clamp, K, Fig. 3, which is mounted in the rear and inside the drum and acts in unison with the clamping screw I, Fig. 1, grips the portion of the bar that is to be cut off and prevents it from falling when

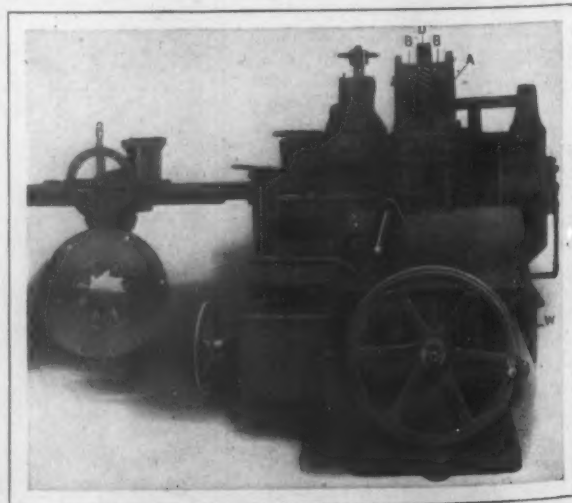


Fig. 2—An End View of the Machine



The cylinder of the main clamp is 8 in. in diameter and has a maximum traverse of 6 in. When air is admitted to the cylinders a double angle wedge moves in unison with the piston rod to which it is connected, and forces the clamping arm to move in a vertical direc-

### Automatic Feed Rivet-Heading Machine

With a view to eliminating the excessive manual labor required in the operation of such machines as rivet and bolt heading machines, nut tapping machines and the like, the National Machinery Company, Tiffin, Ohio, is developing full and semi-automatic equipment of this type. The most recent addition to this line is a new design of automatic feed for its wedge grip rivet-heading machines which has been recently perfected by the company and embodies some novel features.

In this machine mill lengths of long rods are taken on the initial heat from the finishing rolls or reheated in special long furnaces and are started into the feed rolls by the operator. After this has been done the rod is automatically advanced and is blanked, sheared and headed and a finished bolt or rivet ejected at each revolution of the machine. Single-blow bolts, rivets, track bolts or any type of single-blow work can be made in this machine and it is pointed out that the wedge gripping mechanism insures a product free from

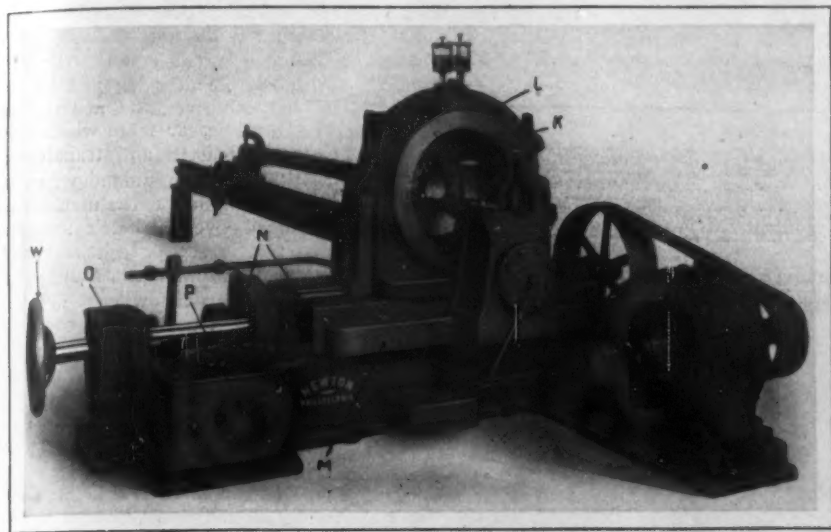


Fig. 3—View of the Driving Side

tion. The direction of each motion is reversed at the clamp I, Fig. 1, and the distance from the pivoting point to the center of the roller on the rear of the arm is twice as great as that from the center of the screw to the pivoting point. The cylinder in the auxiliary clamp K, Fig. 3, in the rear, is also 8 in. in diameter, and when the machine was tested at the builder's shop both were operated under 80-lb. air pressure. In this machine, as in many others built by this company, practice has demonstrated that the wedge form of clamp construction holds the work so securely that it is necessary to apply air in a reverse direction to release the work.

Several interesting tests of this machine have been made at the builder's shops. Among these may be mentioned the cutting of a  $5\frac{1}{4}$ -in. steel bar having a carbon content of 0.47 per cent. in 95 sec. In a recent prolonged test under actual working conditions 684 cuts were made on 0.70 per cent. carbon steel axles averaging 5 in. in diameter without regrinding the teeth once, and the production time, including cutting, removing and clamping of the work, was 300 per cent. better than the best previous records, and the result was accomplished with less labor. In several other tests the changes for successive cuts, including the release of the clamp, adjusting the stock for cutting off exact duplicate lengths and reclamping for the cut, was made in 15 sec., and it was actually possible to keep the teeth cutting 90 per cent. of the working time. This record is attributed by the builder to the method of utilizing air stock clamps, stock trolleys and semi-automatic measuring stops and reversing fast power traverse to the saw saddle. In a recent test on hexagonal steel measuring 5 in. across the flats that was purchased on specifications insisting on at least 0.25 per cent. of carbon, successive cuts were made in 50 sec. Many of these pieces were only  $\frac{1}{4}$  or  $\frac{1}{2}$  in. thick, and were perfectly cold when cut off.

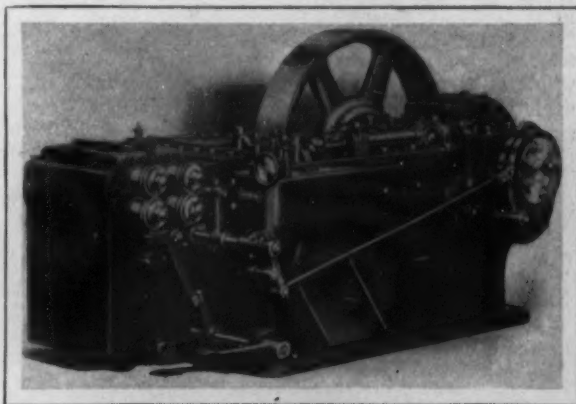
The net weight of the machine exclusive of the stock trolley is approximately 17,000 lb.

The Woodward Iron Company has increased the number of by-product coke ovens called for in its latest contract with the H. Koppers Company from 70 to 80, and the new ovens will be erected in line with the present battery at Woodward, Ala. The H. Koppers Company will start excavation and work on the new contract about June 15. C. V. McIntire will be the erecting engineer.

The Watson-Stillman Company, 50 Church street, New York, is improving its shop facilities to meet increasing business. A new branch office is to be opened at Philadelphia shortly.

swollen shanks or an objectionable fin along the body as the dies cannot spring or give during the upsetting operation.

The feed rolls are chilled castings and have water jackets, a type of construction which it is pointed out maintains an even temperature and insures minimum wear



The New Wedge Grip Rivet Heading Machine with Automatic Feed Built by the National Machinery Company, Tiffin, Ohio

on the feeding surface and positive and uniform feeding. A new type of stock gauge is employed which is designed not only to permit rapid and minute adjustment while the machine is in operation, but also to eliminate spring and thus secure a highly uniform product. This type of machine with the automatic feed is built in three sizes for turning out rivets ranging in diameter from 1 to  $1\frac{1}{2}$  in.

The Quaker City Iron Works, Inc., Tioga and Richmond streets, Philadelphia, Pa., has taken title to an additional plot of ground 133 ft. on Edgemont street by 102 ft. 6 in. in the rear of its present property, also a side plot of ground having 15 ft. frontage on Tioga street, and extending back 358 ft. This addition about doubles the size of the plant, giving the company an acre of ground in the heart of one of the best manufacturing districts in the city. The Quaker City Iron Works manufactures boilers, tanks, smoke stacks, breechings and a variety of riveted plate metal work. Its expanding business required more room.

The large floating dock which is being built in Scotland for Montreal is to be towed to Canada this month.

## An Automatic Vessel Unloader

### An Interesting Motor-Driven Mechanism Capable of Various Applications

A machine for shoveling, hoisting and conveying bulk material, such as coal, ore, gravel, sand, etc., from vessels, boats and barges and transferring it to cars, bins or stock piles on the dock and vice versa has been developed by F.

the machine can be used for unloading into barges, other vessels, cars, bins or docks, or reversing the operation. When so installed the machine travels from hatch to hatch on rails fastened to the deck close to the side and extending the entire length of the ship. When loading, the crane girder is lowered on the side rollers which rest on the cross rails of the ship and is run out to extend beyond the side of the vessel. The crane girder is then fastened down to cross beams between the hatch openings and the carriage with the elevator leg and bucket is run out over the material to the barge or car from which it is scooped, hoisted and transferred to the ship. In unloading, as is the case in Fig. 1, the machine is stationed over a hatch and the material is scooped, hoisted and dumped into a hopper, transferred and discharged where desired. When the vessel leaves port the machine is fastened tightly to the deck and the elevator leg is lowered into a special pocket in the hold of the vessel. If the machine is installed upon a dock bridge and is transferred to the vessel upon its arrival at port, the additional advantage is secured of being able to load cars from stock piles during the absence of the vessel. In this case two rails run the length of the vessel and are fastened to the deck close to the sides and one or more sets of cross rails placed wherever desired are all that are needed to



Fig. 1—A New Automatic Shoveling, Hoisting and Conveying Machine Designed for Use in Unloading Vessels

H. Kindl, Pittsburgh, Pa., who was formerly structural engineer for the Carnegie Steel Company. The principal parts of the device are a girder spanning the material to be removed, a trolley running upon it, an elevator and the system of electrically controlled mechanism by which the whole is operated. If desired slight modifications can be made in its design so that it will also be available for digging and hoisting material from excavations and trenches for irrigation and sewer purposes, stripping mines and doing similar work which is now performed by the ordinary steam shovel. The accompanying engravings show two operations performed by the machine, Fig. 1 being a view of a vessel discharging its cargo, while Fig. 2 illustrates a reversal of this operation, a car being loaded from the stock pile.

As will be noticed by referring to these engravings, the machine is light and strong and consists of but few parts. As far as possible either structural steel or steel castings or forgings are employed throughout. The machine is operated by electric power which can be secured from the power plant on board the ship, the dock or some other location. Although the operation is subject to perfect control by the operator at the same time it is pointed out that a number of the important functions are automatic, the movements of the parts through such operations being derived from the movement of the apparatus itself, actuated by momentum, gravity or the direct action of the hoisting rope. The construction of the hoisting mechanism is very similar to that of a blast furnace skip with automatic limit stops, magnetic brakes and a quick return.

The device can be used in a number of different ways, being carried on a vessel permanently, supported ordinarily on a dock and transferred to the vessel upon its arrival, carried on two piers or docks and carried on special barges or vessels. When the crane girder, movable carriage, elevator leg and bucket are permanently mounted on a vessel

enable bulky material to be unloaded from them. When installed upon two piers or docks the crane girder spans the slip between the piers and rests upon A frames on either side, the frames being either stationary or traveling upon rails located on the piers. When the machine is placed upon specially constructed barges or vessels, it enables ships to be loaded with coal while in the harbor or if the vessels are of the sea-going type, steamers and warships can be coaled while at sea.

Only two men are required to operate the machine, one to handle the controllers for scooping, hoisting, etc., on board the ship and the other to direct the discharge and run the weighing and conveying bins. Electric current for

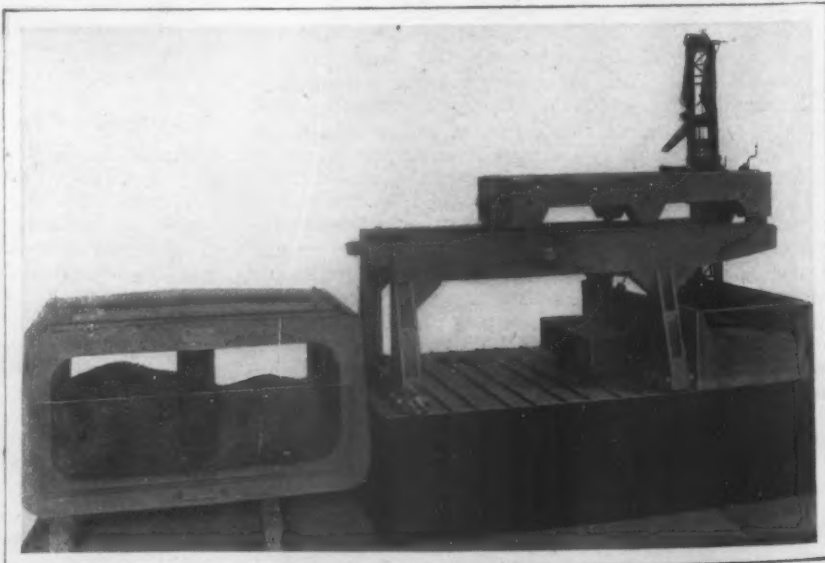


Fig. 2—Loading a Railroad Car from a Stock Pile

a maximum load of 300 hp. is required and can be secured in any of the ways previously mentioned. The motors employed on the machine range from 50 to 175 hp., depending upon the capacity of the machine, but the maximum number in operation at any one time will be three. The capacity of the machine is figured at 700 tons of ore per hour, a



5-yd. bucket making two trips per minute being employed. If the ore is free or a larger bucket is employed, this figure can be materially increased.

## Underwood Bill Passes the Senate

Tariff legislation moved along rapidly in the Senate last week. On Tuesday, May 28, the Cummins amendment to the proposed Underwood metal schedule was defeated by the decisive vote of 60 to 12. Its support came wholly from Republicans. The text of the Cummins amendment was printed in *The Iron Age* of May 9, page 1165.

Wednesday, May 29, was devoted largely to the consideration of amendments to the Underwood bill. The amendments adopted repeal the Canadian reciprocity law, and provide for a duty of \$2 per ton on print paper coming from Canada and reduce the duty on pig iron to 6 per cent., and that on ferrosilicon to 10 per cent. The amendment by Senator Hitchcock of Nebraska reducing the duty on pig iron to 6 per cent. in place of 8 per cent., as fixed by the House, was voted in by 36 to 20, while the amendment by Senator Watson of West Virginia, fixing the duty on ferrosilicon at 10 per cent. instead of 15 per cent., was adopted without a division.

### Ohio Senator Wants Machine Tools Dutiable

There was a prolonged and sharp controversy over an amendment by Senator Pomerene of Ohio to take machine tools from the free list, as the House provided. He first proposed a duty of 30 per cent. and then of 20 per cent. This was defeated 18 to 43. The successful unexpected fight for the repeal of the reciprocity law was inaugurated by Senator Gronna, of North Dakota, who at first proposed the repeal of all the reciprocity law except the second section, which permits the free admission of print paper from Canada.

Senator Gallinger, of New Hampshire, moved as an amendment the repeal of the entire Canadian reciprocity law, including the paper provision. This suggestion was accepted by Senator Gronna, who withdrew his own amendment in its favor. The effect of the success of the Gallinger amendment would have been to restore the Payne-Aldrich rate of \$3.75 per ton on print paper, and Senator Cummins declared his unwillingness to go so far. He then proposed a rate of \$2 per ton on print paper, which Mr. Gallinger accepted. The vote on this amendment stood 37 to 27. Senator Cummins stated positively that if it should become a law the provision would have the effect of placing a duty of \$2 per ton on paper from all other countries as well as on that from Canada.

The bill, with the amendments as stated above, was passed Thursday, May 30, by a vote of 35 to 22, the protectionist Republicans refraining from voting. The affirmative votes were cast by Democrats and one Republican, Senator Gronna. The text of the original Underwood bill was printed in *The Iron Age* of January 25.

### Our Washington Correspondent's Comments

There is some confusion of mind on the part of the reading public regarding the amendment to the Underwood bill, passed by the Senate last week, imposing a duty of \$2 a ton on white paper coming from Canada, especially as the news dispatches from Washington carried the announcement that this action nullified one of the provisions of the Canadian reciprocity act. By most persons the Canadian reciprocity act was supposed to have automatically passed out of existence with its rejection by the Dominion. This is true so far as the purely reciprocal features of the act were concerned, but it is not true of the second section, which was not in any way reciprocal, and had an incidental relation only to the first, or purely reciprocal, feature of the act. This second section, stripped of its legal verbiage, permitted white paper manufactured in Canada and costing not to exceed 3c. per lb. to enter the United States free of duty provided such paper "paid no export duty, export bounty, license fee or export charges of any kind whatsoever." This exemption was aimed at paper manufactured from wood grown on the crown lands of Canada from which the Government received a large annual revenue and which was in effect an export tax. Paper manufactured from wood grown on private land had free access to the American market.

During the last calendar year we imported from Canada in round numbers 25,000,000 lb. of paper free and 29,000,000 lb. additional on which the regular duty of \$3.75 a ton was charged, showing that the importations from both sources were nearly even. Canada has steadily refused to permit the free use of her crown lands for paper making purposes, asserting that she needed the revenues to replenish her national treasury. More than this the Canadian Government knew that the Americans needed the paper and would be compelled to have it, whether it was taxed or not, as has been shown to be the case.

There is no probability that the House will accept the amendment, and the difference will be fought out in conference, the ultimate result of which will doubtless be a deadlock, for the Senate conferees are expected to maintain their position irrespective of the fate of the bill. The House conferees are expected to be equally stubborn, purely as a matter of principle, for both sides are fully aware that if the bill should reach the President he would veto it with little if any delay.

It looks as if Congress will continue in session until midsummer. From present appearances it cannot adjourn before July 1, this being the earliest date that those familiar with the condition of the appropriation bills fix as the time for getting away. The appropriation bills are in a backward state even for a long session. The Indian, Post Office, Legislative and Naval bills have passed the House and are now before the Senate committees to which they have been referred, and no effort apparently is being made to expedite their progress. The Post Office bill, which carries an enormous appropriation, and which this year is overflowing with miscellaneous items, is not likely to be reported to the Senate for at least a week from this date. One of its provisions is certain to provoke more or less discussion. This is the provision relating to a parcel post which the Senate committee has substituted for a like provision in the bill as it passed the House. This alone may occupy the attention of the Senate for several days, and it is a fair probability that the bill will not get to conference much, if any, before June 17. As the House will not accept the Senate substitute for its own—the Senate bill divides the country into zones with a graduated charge from one to the other, while the House bill limits the service to the rural free delivery routes—a further delay will be occasioned that will prevent the bill reaching the President before June 20.

The Naval bill, also, will have its troubles, for the Senate is expected to appropriate for one battleship, and possibly for two. It is believed that in the end the House will be compelled to back down from its position of hostility to a further battleship programme at this session and agree to one ship of the dreadnought class at least.

## The Cracking of Crane Hooks

Cracked crane hooks are reported in a recent issue of *Stahl und Eisen*. In this particular case the hook links at the sides of a yoke for carrying ladles of molten steel showed cracks on the side facing the ladles but the cracking developed only in those hooks nearest the open end of the furnace building and thus exposed to the weather. It was thought that the cracking was due to the combination of local heating from radiation from the iron and the chilling from exposure to the weather. A steel of moderately hard structural grade, which had been purified by the addition of silicon, was employed for the hooks and the conclusion was drawn that a softer steel without the additional silicon should be used for these hooks. It was also stated that in similar cases very coarse crystal formation results from local heating and a case where the side of a ladle hook cracked was reported. Frequently the hooks are found to be highly brittle and break under side shock even when not subjected to a load.

The line of cars to be built by the Canadian Car & Foundry Company at Port Arthur, Ont., will consist of wood and steel freight cars and modern passenger coaches. The works will require all of the land granted as a site and will give employment to 500 men as soon as it is in working order and this force will be increased to 1000 men, probably within a short time. The demand for cars is heavy in western Canada and is increasing.



# A Modern Machine Screw Factory

New Critchley Plant at Worcester—Lessons in Economy Resulting from Improved Conditions—Cost of a Two Story Compared with a One Story Building

The Critchley Machine Screw Company, Worcester, Mass., which manufactures exclusively special machine screw products turned from the solid bar, is occupying a new factory on Armory street, South Worcester, adjoining the Norwich & Worcester division of the New York, New Haven & Hartford Railroad. The plant has various features both original and valuable, and the experience of the company in designing the building conveys useful lessons.

A striking commentary exists in the economies resulting from the transfer of the business from two factories, which, while modern, were not designed to fill the needs of the industry to a plant especially adapted for the purpose. The saving in the cost of trucking and insurance, together with the better prices obtained by the sale of scrap in carload lots, total a figure which pays the interest on the entire real estate investment.

The building is two stories, 60 x 154 ft., and the construction is such as to provide for two additional floors. The structure is of brick with concrete foundation, reinforced concrete columns and heavy steel girders. The intention was to make it a one-story building covering a proportionately greater ground space, but the cost of a one-story factory per square foot of working floor space

was found to be almost double that of the two-story building. J. Verner Critchley, the owner of the business, believes that the factory design has worked out as advantageously in effecting economical production as would have

been the case were there but one floor. The estimates also showed that the cost of the building was about the same as one of reinforced concrete throughout.

The first floor of the building is 6 ft. below the ground level. However, the rooms are very high studded, as can be seen from Fig. 1; it is 12 ft. from the floors to the bottom of the 15-in. girders, above which are 4-in. spiking beams, so that the total height is nearly 14 ft. This permits windows 5 ft. high in the first floor rooms. Moreover, prismatic glass is used, which refracts the light to the center

spaces. In fact, the walls of the building are practically all glass. On the first floor the windows are 7 ft. 3 in. wide, while the brick columns between them are but 24 in. wide. On the second story the windows are 9 ft. high by 7 ft. 3 in. wide. Steel sashes are used throughout. The woodwork of the factory is most substantial. The floors are of 4-in. plank, over which is laid hard maple flooring.

Much attention was given the color scheme of the interior. In the factory the walls and columns to a height of 6 ft. are dark green, while everything above is covered

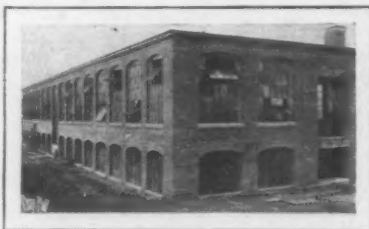


Fig. 1—A Corner of the Factory, Showing the High Walled Basement Which Provides Abundant Light



Fig. 2—A Portion of the Automatic Screw Machine Department of the Critchley Machine Screw Company

with a water white paint. The nature of the work is such that the darker color is necessary in order not to show the inevitable smearing of oil and dirt. The office is finished throughout in southern pine in its natural color, while oak furniture and steam pipes enameled in yellow combine to give a warm and sunny effect. It is a striking example of a constantly increasing practice of making an office an agreeable and cheerful working place, a condition which no doubt increases the efficiency of those who are employed there.

Every effort has been made to reduce the fire hazard in the construction of the building by the presence of automatic sprinklers and by the use of double wire ribbed glass in those windows which are in proximity to the two neighboring wooden buildings which constitute the only hazard from the outside. The consequence is that the insurance rates have been so reduced that the rebates on unexpired policies on the former plant pay the entire premium on \$60,000 of the new insurance for three years. The cost of trucking is reduced by being able to receive carloads of steel at the door and to ship steel turnings in carload lots.

Two sides of the corner of the yard are walled with concrete, affording storage for scrap material, which is reached by a spur track from the railroad. This material is an important item, for the factory produces two carloads, some 60 tons, each month. Of course, much better prices can be obtained when the material is shipped in carloads. In the factory the scrap is handled economically in specially constructed boxes on wheels, one of which is shown in Fig. 7. They are of wood, 27 x 38 in. at the top and 30 in. deep. The bottom is hinged, and is held in position by a latch. Two parallel edges of the top are fitted with angle irons, in which slide the shaker. At each corner is an ear having a hole. When the box is filled with scrap which has been cleaned of its oil by separators on the second floor, it is trundled by hand to a platform at the door. A trolley connects the platform and the scrap pile. A chain hoist has four long hooks which are placed in the ears of the box, which then runs by gravity to the other end of the rail. A pull of the trigger releases the latch and the bottom swings open, permitting the load to fall.

As the second story is the main floor of the factory, the loading of the finished product is done there. This floor being raised so high above the ground to permit the high windows of the first story is well above the level of



Fig. 4—The Steel Storage Racks

the loading platform, which is of a height corresponding to that of a truck. The second floor is connected with this platform by a wide chute, down which boxes or other receptacles slide to the platform. The arrangement has proved highly satisfactory.

The machinery is placed in groups, as is illustrated in Fig. 2, each having a line shaft driven by a motor. Two adjacent groups are ingeniously arranged so that either may be driven by the motor of the other in case of emergency. The driving shafts are in line, with ends separated only enough to permit the introduction of a plate between two couplings. The plate being always at hand, it is only a matter of a few moments to make a single unit of the shafts. Consequently, should one motor break

down the other would drive selected machines of both groups. The factory has no power plant, but purchases the 150 hp. required at the present time to operate its machinery.

The handling and storage of raw material is an important consideration in this factory. The company is now using eight carloads or 240,000 lb. of bright, drawn steel monthly. It is delivered from the car to a loading platform at the first story, from which a trolley with a hand hoist runs to the racks. The platform, which is inside the building, is the top of one rack which stores 200,000 lb. of steel of special sizes. The bottom of the main racks is 20 in. below the floor level and consists of boiler plate grouted in cement. The steel stands on end. The pockets are separated by horizontal pipes fixed in a heavy wooden beam, as shown in Fig. 4. Each

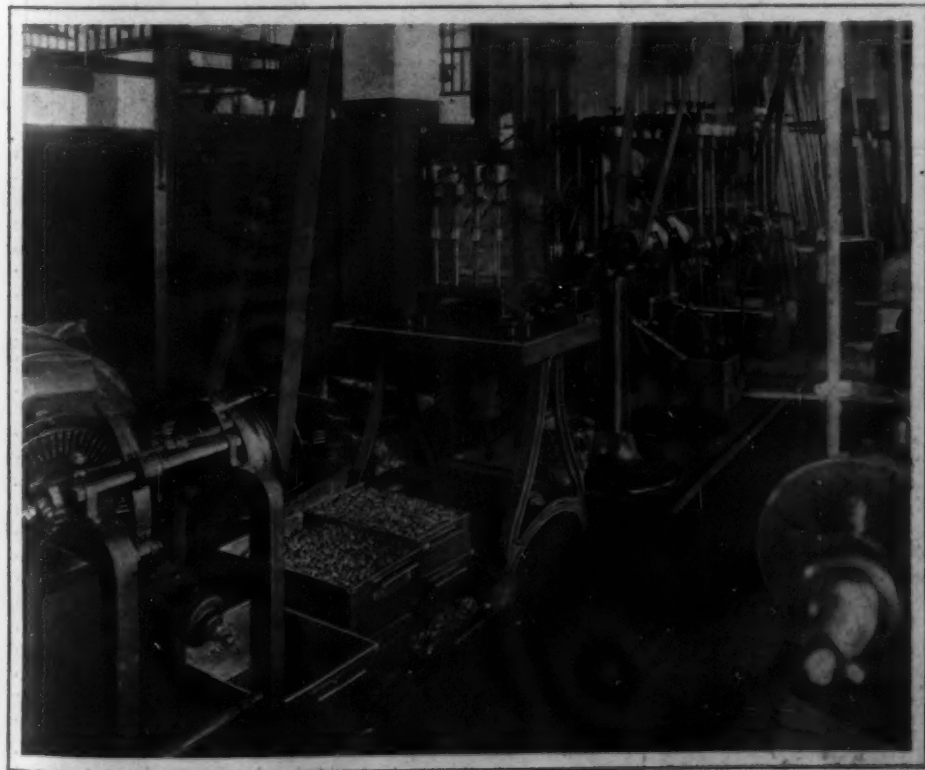


Fig. 3—A View in the Second Operation Department, Showing Special Machines

of the 100 pockets has a capacity of 12,000 lb., affording a total storage of 600 tons.

An example of the thoroughness of the factory system is the complete separation of the brass turnings from the rest of the scrap. This material has its own oil separator located in a space cut off from the rest of the factory by a high partition. No brass scrap is permitted to leave the department until it has been packed in barrels ready for shipment. System and order are noticeable conditions everywhere.

All around the building are work benches made of maple planks 3 in. thick resting on iron legs. Each operator has his own section bench, together with his individual vise and tool grinding machine.

The racks for the change gears and the chucks and wire feeds of the multiple spindle automatics, Figs. 5 and 6, are most interesting. This latter rack consists of a column passing through the center of circular shelves and supporting them. In them are set wooden plugs of the

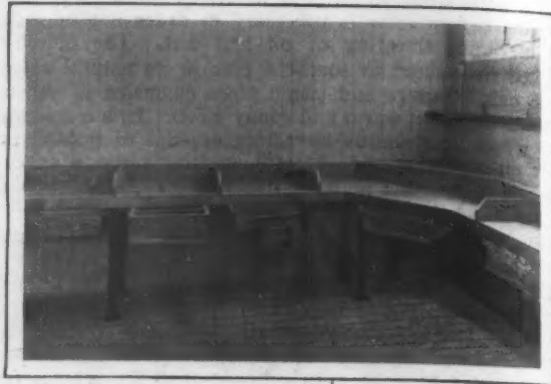


Fig. 8—A Corner of the New Inspection Department, Showing Bench Construction

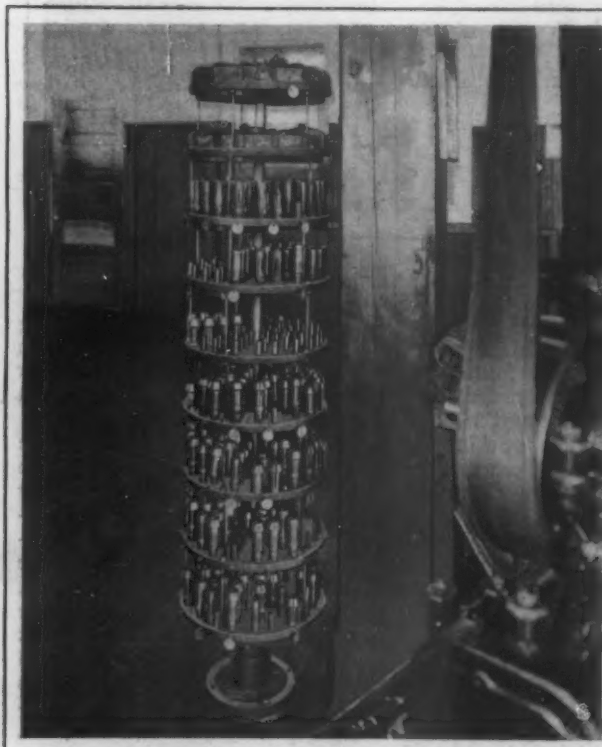


Fig. 5—Racks for the Orderly Storage of the Stock Feeding Fingers of the Multi-Spindle Automatics

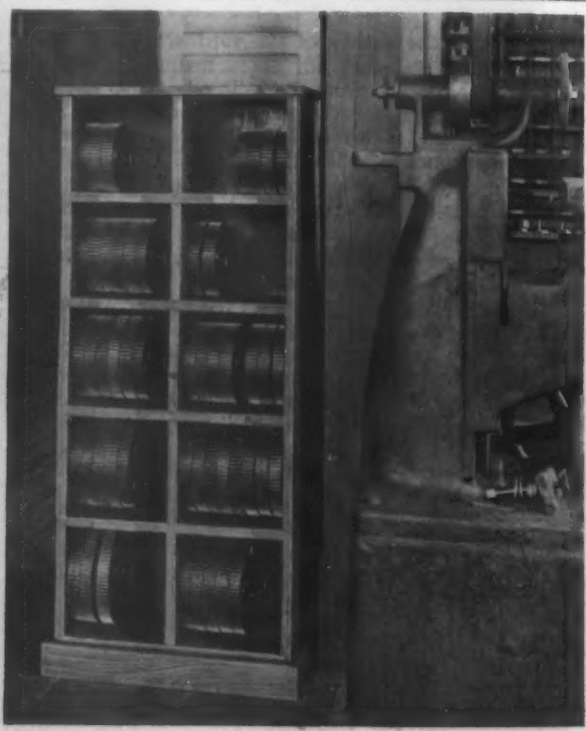


Fig. 6—Racks for the Storage of Change Gears

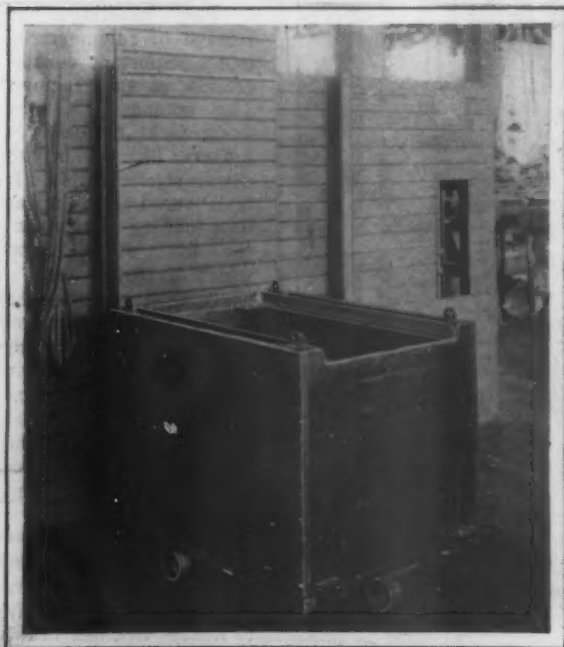


Fig. 7—The Box Used in Handling Turnings

proper size to take the stock feeding fingers. The plugs are arranged in groups of four for the four-spindle machines and of five for the five-spindle. In the former the groups are obtained by placing four plugs in a radius line and between each two such radii a group of four in the form of a Y. The separation of each group from the others is sufficiently marked so that there can be no confusion. On the edge of the shelf opposite each group is its number or size on a brass tag. The change gear rack consists of two banks of pockets, placed back to back and slightly inclined. Each size of gear has its pocket, as indicated by a brass tag.

The growth of the business has been extraordinarily rapid. It was established in 1906 in a small room on Union street, Worcester, with four single-spindle automatic machines. To-day 65 automatics are required, ranging in capacity from the smallest to  $2\frac{1}{2}$  in. diameter, while the hand-screw machine department, second operation department, a portion of which is shown in Fig. 3, tool room and hardening department are correspondingly large. In 1907 the demand for more room resulted in moving to 100 Beacon street. In 1911 the screw department of the J. L. Parker Company was purchased, and additional space was taken on Jackson street. Last year when the present site, containing 60,000 sq. ft., was acquired Mr. Critchley provided for 100 per cent of growth in the new building, but already the need of additional space in the not distant future is apparent. Much additional equipment has been purchased and the 100 operatives are working overtime.



# A Training School for Automobile Workers

Features of a System Established by  
the Cadillac Motor Car Company to  
Equip Apprentices for Their Work

The rapid growth of the automobile industry has brought about changes in industrial conditions affecting the employees of most of the larger plants producing motor cars and has presented new labor problems which the manufacturers have been forced to face and solve. The building of motor cars on a large scale, requiring the turning out of immense quantities of duplicate parts, has developed more than ever a demand for a class of workmen to operate machine tools who are specialists rather than good all around mechanics. Attractive prices paid by manufacturers for piece work have drawn men into this class of employment, at which with the required skill and ability they were able to earn better wages than as

School of Applied Mechanics of the Cadillac company. It was started in 1907 and its original scope was enlarged at the beginning of 1912 to include a training room well equipped with machine tools and instruments for instruction purposes. In this room the apprentices receive their preliminary instruction in operating machines. The school has long since passed the experimental stage and has become one of the permanent departments of the company. It started with but a few pupils, but the number has grown to 125, and as the work has become better known there are usually plenty of young men anxious to take advantage of the opportunities offered. Occasionally when more boys are wanted than are available a want adver-



Class Room of Cadillac Motor Car Company's School of Applied Mechanics, Detroit, Mich.

general mechanics, and there was little inducement for an apprentice to learn the trade as a mechanic when he could become proficient at piece work more quickly and earn more pay doing special work. Automobile builders generally have encouraged the development of the piece workers to a high degree of efficiency, realizing that the greater number of parts a workman can turn out on a machine the fewer machines are needed for the same output, which means a corresponding reduction in the investment for plant equipment. It has resulted from this specializing among their employees that motor car makers often have trouble in securing good machinists and tool makers and in finding men competent to become foremen and to fill other responsible positions.

## Beginning of the School

To develop young men into trained machinists and tool makers in order to have competent men to depend on when needed in its shops, and also to provide them with training that will eventually enable those best fitted to become foremen, draftsmen and tool designers and to fill other responsible positions, the Cadillac Motor Car Company, Detroit, Mich., established an apprenticeship school in connection with its plant. This department is not known as an apprenticeship school, but is called the

tisement inserted in a local paper brings plenty of applicants.

## Requirements and Compensation

Applicants for admission must agree to refrain from the use of cigarettes, chewing tobacco and intoxicating liquors while in the company's employ and to remain with the company through the entire course of instruction, which is two years. They must be 18 years old or over to be admitted, this being required by State law. There is nothing really binding in the agreement and about half of the students drop out before their two years' course is completed. The company reserves the right to discharge any apprentice if his services are not satisfactory or if factory conditions warrant such action.

The students are paid 14 cents an hour at the start, and at the expiration of each six months their pay is increased 1 cent an hour, so that during their last six months as students they receive 17 cents an hour. All are on the same basis, pupils who have had some former experience receiving no more than those who have had no such experience. In addition to his pay each student receives a bonus of \$100 on his satisfactory completion of the two-year course. The students work 10 hours a day during five days a week and 5 hours on Saturday. The school is



Another Class Room View. Apprentices Taking Notes of Blackboard Instruction

in charge of M. B. Hughes as instructor of students. He has three assistants who, by technical training and practical experience in machinist's work, are well qualified to act as teachers and who devote their whole time to instruction. The school is housed in a well-lighted room about 40 x 40 ft. on the second floor of one of the factory buildings. This room is divided by a partition and one-half is used for the lecture and class room and the other half as the training room, containing the machine tool equipment.

#### Class Room Work

The course of instruction includes class and lecture room work during the regular working hours from 12:30 to 1:30 P. M., which each pupil is required to attend once a week. There is also a drawing class for an hour and a half each week for students in the evening. Attendance on this is optional and the pupils who do attend are paid for their time. The class room work includes practical talks on such subjects as screw threads, mathematical cal-



View in the Training Room



culations relating to shop work, iron and steel making, hardening and tempering, gearing, gas engines, combustion, machine design, movement studies, automobile construction and electricity as applied to the gas engine. All instruction is made as practical as possible and demonstrations are given with machines and mechanical appliances to make the instruction clear and more practical. During the lectures the students take notes and ask questions.

#### Work in the Training Room and Shop

Practical instruction in the operation of metal working machines was formerly given in machine shops, but a few months ago a regular training room was established. This contains the following machine tools and accessories: 14-in. lathe, 18-in. lathe, hand milling machine, universal milling machine fully equipped with constant speed device, three grinding machines, two drilling machines, speed lathe, gas furnace, pyrometer, micrometer, high gauges and vernier caliper. When a student begins his course he is put on the bench in the training room about two weeks; then he is sent to the shop, where he works on the bench about three months. After spending that amount of time on a bench in the shop he is sent back to the training room and his regular course of work from then until his term

ship. When the students are at work in the shop they are under the department foreman, who gives them as much instruction as possible.

#### Speed and Efficiency Emphasized

The work done in the training room is chiefly regular manufacturing. From the start it is impressed on the students that production, speed and efficiency are as important as technical training. The regular speed of production that prevails in the shop is required. When they start in the training room students are broken in with hard bench work. This puts them to a good test and shows pretty well whether they will stick to their intention to go through the necessary course of instruction and become trained machinists. About half of all the students who drop out do so under the strain of the severe bench work of the first two or three weeks.

When the students complete their course they are given regular employment in the shop, being paid the customary wages for what they can do. A large share of the apprenticeship students are employed in the company's tool room after finishing their training. Out of 50 students who finished their course between January 1 and April 1 last, 33 are now in the employ of the Cadillac company. Of these



Fig. 4—Members of the Cadillac Motor Car Company's School of Applied Mechanics and Nine Officials of the Company

of instruction is nearly finished consists of one week in the training room on the machine and then three months in the shop on the same type of machine. The student is given this work in the following order: Drilling machines, milling machines, lathe work and grinding machines. This is followed by three months' work in the tool room without special training in the training room. However, it is planned to also give training room instruction in tool room work. The addition of a course of training in engine assembling is now being considered.

While the students are at work in the training room they are under the watchful eyes of Instructor Hughes and two assistants, who go from one to another to see that they are doing their work properly and to give them needed instructions in the proper use of tools. To develop foremanship ability one of the boys who has nearly finished his course is given charge of the training room. He gives other students their work and sees that it is out on time. He is advised on mechanical matters by the other three instructors. One of the students best qualified for the work is selected as assistant in charge of the training room, which place he retains three months. When the student above him finishes his course the assistant takes charge of the room and another student becomes his assistant. In this way many students are given six months' experience to develop qualities along the line of foreman-

ship. 18 are working in the tool room, 11 in the repair and testing departments, 2 in the drawing room and 2 in other departments. Experience in the Cadillac plant indicates that a young man is better trained as a machinist at the completion of a two-year course in the school than he would be after spending four years in a shop where he secured the training of an average apprentice, and that he will advance faster than the average mechanic who has had the four years of ordinary shop training. Of those who graduated from the Cadillac school in 1909 one is manager of a large Detroit garage, one is foreman of an automobile plant and a few are draftsmen, while the majority are tool makers. Positions held by more recent graduates are also evidence of the success of the school.

In establishing the Cadillac school, Henry M. Leland, formerly general manager of the company and now advisory manager, had in view not only the advantage he would secure for his company by fitting young men for positions in the Cadillac plant, but he felt that he would be doing a good work for the boys themselves by providing an opportunity to secure practical training and fit themselves for earning better wages than they otherwise would. The school has also had the able co-operation of Chas. L. Carson, the superintendent of the plant. Instructor Hughes is enthusiastic over his work and is given much credit for the success of this school.

# The Nathusius Electric Steel Furnace\*

## Details of a Recent Development of the Arc Type and Its Application to the Refinement of Steel

BY HANS NATHUSIUS

In this furnace the charge is heated on the surface by several electric arcs, so distributed that the heating is effected as equally as possible. Heating by a single arc is absolutely impracticable, because the arc, though a very intensive, is a highly localized source of heat. Since the maximum desired temperature of the furnace is between 1900 and 2000 deg. C., it has been the author's endeavor to weaken the intensity of the arc as much as possible, and to reduce the unavoidable overheating on the surface of the charge to a minimum. To effect this he transferred as much as possible of the energy required for a particular furnace to the bath, or rather to the bottom of the bath, and the method of heating thus approximates to that of an induction furnace. By the aid of special

to 6 tons capacity are tilted on trunnions resting on vertical supports and larger sized furnaces have rockers resting on rollers.

The characteristic of the furnace is that it has three carbon electrodes above the surface of the charge which project through the roof into the furnace, and three or a multiple of three bottom electrodes of mild steel rammed in the hearth. The upper as well as the bottom electrodes are arranged in a regular triangle. No regulating devices or other electrical apparatus, such as transformers or motors, are attached to the furnace itself, but these are installed in a separate room behind the furnace as shown.

### Details of the Furnace

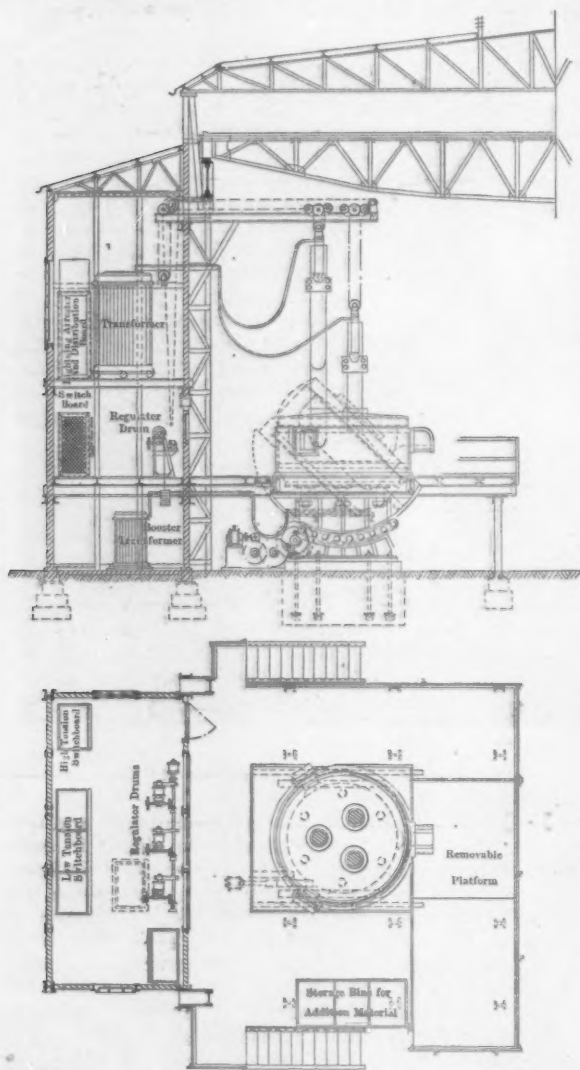
The furnace is purely a metallurgical apparatus, and all operations may be performed without risk of burning a motor or transformer, or exposing a regulator to dust. The carbon electrodes, which require continuous adjustment, are suspended by cables from overhead runways and are either adjusted electrically or by handwheels from the switchboard. From the room where these are installed a good view of the furnace is possible. The independent suspension of the carbon electrodes comprises a number of advantages; first, it allows of tilting the furnace without having to tilt the electrodes. The breaking up of the electrodes is thus considerably reduced, as this generally takes place when the furnace is being tipped. When tilting the author's furnace the electrodes are simply drawn up; secondly, by suspending the electrodes from runways they can be readily drawn away to one side by a chain and quickly changed.

The lining of the furnace may be either basic or acid, and the roof is built of silica bricks. In a basic furnace the bottom and the side walls are lined in the usual way. In the furnace under consideration, owing to the good distribution of the arcs and their reduced intensity, the local overheating of the surface is not so great. Approximately, 100 heats may be obtained under one roof when only cold metal is charged, and nearly double that number when hot metal is charged. The fact of the current flowing through the bottom increases its durability considerably, as the bottom itself is heated to a high temperature it becomes burnt automatically. For the same reason repairs can easily be made, because the dry dolomite mass when thrown on the bottom is immediately burnt on. Any holes retaining puddles of liquid metal, which might prevent the burning of dolomite, are emptied by tipping the furnace to a sufficiently steep angle. Slight repairs to the furnace can conveniently be done during the interval between two charges. Heavy repairs to the bottom are never required.

The current employed is three-phase alternating current of any convenient frequency. The furnace can be connected direct to a step-down oil transformer, which reduces the voltage of the mains to that of the furnace, 110 volts. Different systems of connection are employed according to the particular requirements of the furnace. The simplest and most useful connection when working with fluid charges is three surface carbon electrodes which are connected to the outer terminals of the secondary windings of the furnace transformer and three bottom electrodes connected to the three inner terminals of the secondary coil. The current, though supplied from a single source only, is forced to flow not only between the upper and bottom electrodes, but also between any upper electrode and any bottom electrode. It is thus possible, with a single source of current, to heat the charge in all parts, provided that its resistance is sufficiently high, or that the current is strong enough to produce sufficient heat in the charge when the resistance is low.

In a 5-ton Nathusius furnace the tensions are under normal conditions, as follows:

Between the upper electrodes.....	110 volts
Between the lower electrodes.....	10 volts
Between the upper and lower electrodes.....	61 volts



Elevation and Plan View of the Nathusius 12-Ton Arc-Resistance Electric Furnace for Manufacturing Steel

means for distributing the current, it is possible to transfer a larger amount of energy to the arcs at the surface, or to the bottom electrodes as desired.

From the drawing it will be seen that the furnace is circular in form. The radiation and conduction losses are thus reduced to a minimum, and the doors allow of a convenient access to the hearth for the performance of the required metallurgical operations. The furnace can be tilted by electric or hydraulic means. Small furnaces up

\*From a paper read before the Iron and Steel Institute.



The tension between the upper electrodes and between the upper and the lower electrodes is constant, whereas the tension between the lower electrodes depends on the resistance between them.

#### Metallurgical Applications

The question is now, how can an arc-resistance furnace be economically applied in metallurgy? To give a general answer is impossible, as it depends entirely on individual or local conditions as to how the electric furnace can be applied to the best advantage. Taking the case of large blast furnaces and steelworks where there is available blast-furnace gas, and therefore also comparatively cheap current and liquid steel either from a converter or an open-hearth furnace, and where the required product is ordinary steel for rails, structural steel, projectiles, tubes, plates, hydrogen flasks, etc., in large quantities, an electric furnace of the same capacity as the converters or the open-hearth furnaces is the most suitable, as undivided and partially refined charges can then be used. Whether this is possible depends upon whether there is a sufficiently good market for the grade of steel to be produced in the electric furnace. At Friedenshütte, however, a 5-6-ton furnace had to suffice, and this was in continuous work for more than two years in combination with basic steel works. The converters there have a capacity of 12 to 15 tons, of which 5 to 6 tons are charged into the electric furnace, and the remainder is cast into ingots.

The partially refined initial charge of the electric furnace was of the following average composition:

	Per Cent
Carbon .....	0.067
Manganese .....	0.460
Phosphorus .....	0.065
Sulphur .....	0.070

After completion of the refining operation it had the following average composition:

	Per Cent
Carbon .....	0.050
Manganese .....	0.100
Phosphorus .....	0.005
Sulphur .....	0.010

The method of working is unfavorable, because the deoxidizing additions must again be removed, which means waste of time and current.

One question arises whether it would not be possible under certain circumstances to work the electric furnace economically in direct connection with the blast furnace or mixer and dispense with the converter or the open hearth furnace altogether. In the present state of the electric furnace the author is of opinion that such a step would be premature. In large metallurgical works cheap producer coal is generally available. In such cases gas firing is always a cheaper heating agent than the electric current, even when the latter is generated by blast-furnace gas engines. Even if coal is expensive and electric power very cheap, say 0.14c. per kilowatt-hour, the question must still be answered in the negative. In working up direct metal in an electric furnace by a process similar to the ore process in the open-hearth furnace, the refining would take too long a time, on account of the large quantities of ore and slag which would be required in the neutral atmosphere. The control of the large quantity of slag by heating from above with arcs would no doubt be a most difficult problem, and the refining would be indefinitely prolonged. Even with the cheapest possible power supply the cost of transformation would unquestionably be higher than that of heating an ordinary tilting open-hearth furnace.

The author is of opinion that the conversion of pig iron by electricity may economically be performed in a heated mixer or tilting open-hearth furnace. When an open-hearth furnace is charged with hot iron either direct from the blast furnace or from a hot mixer the whole bath must be kept unnecessarily hot for a long time after adding the cold slag additions before an energetic reaction can take place between the metal and the still unfused slag. The slag additions might with advantage be melted in a separate furnace, and for this purpose the combined arc-resistance furnace is better suited than any other because of the high temperature attainable and the high resistance of the charge. The fluid slag of the proper composition can then be charged direct on to the metal bath. A violent reaction and disturbance will then take place in the bath,

and the refining will be completed in a very short time. In large steel works, with a row of open-hearth furnaces at work and where the demand for fluid slag is continuous, the electric furnace may be arranged as a kind of slag-mixer, which can always deliver slag capable of reaction. This method might perhaps be usefully applied in the Talbot, Bertrand-Thiel, or Hoesch processes. In any case, the time of the refining process would be considerably shortened, while it is evident that the two molten masses can react more rapidly on each other. The reaction is also certain to be more complete than when the slag is charged cold. Under these conditions it may become possible to convert direct metal into mild steel in an electric furnace, assuming the electric energy is generated by means of blast-furnace gas.

#### Melting of Ferroalloys

For the melting down of ferroalloys electric furnaces may also prove highly useful in large iron and steel works. To melt down the expensive alloys quickly and without waste or evaporation losses, the heating must be as uniform as possible—conditions which can be realized fully with an arc-resistance furnace. The West German Thomasphosphate Works has a method for melting down and working these ferroalloys in which the material is to some extent overheated, is kept molten for some time in a mixer under the one slag, and is overheated somewhat without loss of manganese through burning or evaporation. This process has been used for more than a year at Friedenshütte in Upper Silesia, using an arc-resistance furnace of 2 to 3 tons continuously to melt down ferromanganese for use in the basic Bessemer converter. The gain obtained by this process amounts generally to 8.4c. net per ton, and has at times risen to over 9.6c. based on the saving of ferromanganese, which amounts to about 30 per cent. of the former consumption when using it cold. The saving is effected by taking up all the molten ferromanganese into the bath, and the losses in the slag are eliminated. The molten ferromanganese reacts much more vigorously, and a smaller quantity is therefore required to produce the same reducing effect as a larger quantity of cold ferromanganese. Lastly, ferromanganese which has crumbled to powder through storage for a long time may be used without disadvantage, whereas formerly it was considered valueless.

Even if the costs of current, ferromanganese, and other items were such that there would be no net saving, it would nevertheless be of advantage to erect an electric furnace for the process. Using molten and somewhat overheated ferromanganese, important improvements are obtained in the quality of steel, and the working is facilitated. The speed of diffusion with molten and slightly overheated ferromanganese is much greater than that of cold, the reason being that the reactive capacity of the molten alloy is much greater, and the deoxidation of the steel is consequently much more thorough. This is shown by the fact that overblown charges can easily be remedied with molten ferromanganese. Further, material containing 0.25 to 0.3 per cent. of manganese can be easily rolled without cracking when the charge has been reduced by molten ferromanganese, while the material from similar charges reduced with cold ferromanganese containing up to 0.3 to 0.4 per cent. have broken in the rolling mill.

Further, what is very important in the manufacture of rails, the portion of the molten ferromanganese which is required to alloy with the steel distributes itself much more regularly in the iron, as the alloying capacity of the molten ferromanganese is much greater than that of the cold ferromanganese. The segregation of the manganese is thus eliminated, and also the reducing back of phosphorus from the slag into the bath when cold ferromanganese is used, is avoided. The molten ferromanganese does not come into contact with the slag of the steel charge, because it is poured straight into the clean stream of metal while the converter is being poured. The result is that the desired chemical composition of the final product is obtained with much greater certainty, and spoiled charges are avoided. Since the adoption of the molten ferromanganese process at Friedenshütte, the analysis of the converter charges have shown a much greater uniformity.

The foregoing clearly shows that the melting down of ferromanganese in an electric furnace, and its application all at once in the liquid state for the deoxidation of basic

steel charges, is an important metallurgical improvement on the Bessemer process. The technical progress of the latter method has of late years been more in a purely constructive direction. In the metallurgical sense, a certain stagnation seems to have set in which has brought the old process into discredit. The author hopes that this new method of reduction will serve the purpose of restoring its former credit. Among basic steel works in Germany which have adopted the new process may be mentioned the Friedenshütte Works and the Hasper Works.

It is obvious that the same process may be applied to the basic open-hearth furnace or the Talbot process, when a large number of these furnaces are working continuously. The saving in ferromanganese will probably be as great in these cases, and an improvement in the quality of steel would result. The new method would also prove of great advantage in cases where reduction must take place in the ladle, as in the Talbot process. Instead of ferromanganese alone, one might also melt down mixtures of ferromanganese and ferrosilicon or aluminum, according to requirements. The author believes that steel alloys of tungsten, chromium, molybdenum, etc., as used for ordnance and armor plates, may with advantage be melted down in a small electric furnace and charged in a molten condition. This method ought also to be useful in the production of high silicon steels and high manganese steels.

In conclusion, the author must not omit to refer to the following applications of the electric furnace. There is a great deal of waste at large tool steel works of valuable steel alloys, such as turnings of nickel, chromium, tungsten or high silicon steels. This waste cannot be melted down with advantage in an open-hearth furnace or in a crucible furnace. The reducing slag and the oxygen of the open-hearth furnace gases would cause a great waste of valuable material. In a crucible furnace the material may absorb carbon from the crucible, and, being too open, it is not suitable for charging crucibles. The crucible furnace is also too expensive. In the electric furnace the material may be melted down under a neutral slag and in a neutral atmosphere, practically without any waste and without changing the chemical composition of the charge. The electric furnace is also more suitable for open material on account of the easy access and its greater capacity compared with the crucible.

### Discussion of the Paper

A. Windsor Richards, in opening the discussion, expressed the opinion that except in countries where there are large deposits of good iron ore and cheap power, the electric furnace is not likely to make much progress, and this was particularly the case in Great Britain. Referring to the use of the electric furnace to furnish molten oxides for open-hearth work, he said that no doubt, as the author pointed out, that would hasten the process very much, but this would be achieved at considerably greater cost, and at the same time it must be borne in mind that the resultant material would not be electric steel at all, but Talbot, Bertrand-Thiel or Hoesch steel. He objected to the author's suggestion of the use of two furnaces, one for melting the oxides and the other for refining, also for the use of three furnaces, reducing the iron in the slag and preventing any loss of phosphorus, so that no worthless slag was produced; he scarcely thought such a complicated method of operation practicable. The most interesting part of the paper was that relating to the melting of ferromanganese and other ferro alloys in the arc furnace. This should commend itself to steel makers. He agreed that there would be less ferromanganese used and that it would be more efficacious.

#### Induction and Arc Furnaces

E. C. Ibbotson, commenting on the author's strictures on the induction furnace, pointed out that the original induction furnace is still at work in Sweden, and although the owners there had tried other types of furnaces, the simple induction furnace is competing in the production of high-class tool steel, and has been working for some years perfectly satisfactorily. He knew of a case of an induction furnace being altered into a refining furnace and working fairly satisfactory. Also, at Luxemburg four electric furnaces are at work and making very excellent steel castings. Up to the present he had not seen

any castings made in an arc furnace that would compare in quality with the high-class steels of commerce. With regard to the consumption of current in arc and induction furnaces for the same amount of refining, he believed the induction furnace steel held its own. There had been a good deal of exaggeration about the pinch effect and also about the heating of slag. Possibly there was something in this latter from the basic man's point of view, but as regards consumption of current for an equal amount of refining, he believed the induction type of furnace had done well. Unfortunately the induction furnace in Great Britain had not had a fair chance. In Sheffield the first type of induction furnace installed was only supplied with half the current required. After that an induction furnace was put down in Sheffield by an electrician, which never had the proper lining, and the result was nil. There could be no doubt that the induction furnaces installed in Great Britain had been subject to alterations which were not improvements on the furnaces which had been working satisfactorily on the Continent for some years.

E. H. Saniter spoke of the use of bare as against covered electrodes. For molten metal covered electrodes would be satisfactory, but with cold charges less so, and this was borne out by the costs given in the paper. He agreed with Mr. Richards as to the awkwardness of transferring slag. As to the melting of ferromanganese in the electric furnace, he thought this might be excellent for the basic Bessemer process, but if applied to the open-hearth process, where there is no waste of manganese with present methods, he did not see that the proposal of the author gave any economy.

E. Kilburn Scott objected to the arc furnace on the ground that the electrodes were troublesome to renew, it being necessary to stop everything for their renewal. The electrodes had also a bad habit of breaking off in lumps, and a further disadvantage was that they were supplied by only one firm at Niagara and were very expensive. Reference had been made to the important point of the cost of current, and the author referred to a price of 0.7d. per kw. hour. He believed that the lowest cost that could be looked for was 1-10 penny for production in Great Britain at the present time, whereas the price in Norway of 20s. per kw. year represented 1-36 penny per kw. hour, and that was the point to which the advocates of the electric furnace had to work down. That could not be done in Great Britain with present plant, nor with gas engines either. If large steam turbines of 25,000 hp. were adopted, following up by carrying out Professor Bone's attempt to make a boiler with an efficiency of 90 per cent., then 1-10 penny could be improved upon, but it was doubtful if the low cost of Norway could ever be reached.

#### A Complicated Furnace

C. C. Gow said that the only important advantage claimed for the complications introduced by Dr. Nathusius in the simple arc furnace was the generation of heat in the bath itself by the passage of a heavy and variable electric current. This is of first importance while the alloying elements are being added. As a rule that period lasted about ten minutes. The heat produced by the bottom electrodes might be regulated from zero to any desired maximum, and to imitate the induction furnace during the period of alloying it would be necessary in a 5-ton Nathusius furnace to pass fully 300 kw. through the bottom electrodes; the tension of the bottom would only be 10 or 12 volts, so that the cables and transformers would have to be constructed to carry current for a furnace of such a size. Dr. Nathusius did not say what maximum power he intended to put through the bottom, but unless it was at least several times greater than that expended at the surface, the advantage claimed was not fully justified. The alloying was actually effected when only 40 and 60 kw. were being consumed by the bottom, as against 350 and 220 by the top electrodes. He could not see that the generation of heat in the bath and in the bottom, equivalent to an average of only 50 kw., was going to be of any material advantage, and certainly it would not fulfil the conditions aimed at or justify the complicated additions to the simple arc furnace and its electrical equipment. With covered electrodes a great point was made of generating the heat in the dolomite itself. This was a disadvantage, as the nature of the dolomite was likely to alter by further burning after ramming, as the author suggested,



and this would undoubtedly cause contraction and probably destroy the solidity of the bottom.

#### The Question of Economy

A. Greiner considered the design of the Nathusius furnace ingenious and agreed that there was an advantage in having great heat in the bath, with such reactions between the slag and the metal as resulted in 0.004 phosphorus and 0.01 sulphur. Such results he had not been able to get in his electric furnace. Apparently, also, the author had made great progress with regard to the melting of ferromanganese, because, as that material was being worked now in the cold state, it was not satisfactory. At the same time the expense of working ferromanganese by an electric furnace was very high, and that must be taken into account. With manganese as high as £14, as it had been this year, perhaps this extra cost was not so important, but when it came down to £8, or thereabouts, the process described in the paper was not so valuable in the competitive sense.

Walter Dixon remarked that for ordinary work it was clear that the electric furnace would for a long time be quite unable to compete with present methods on the score of cost. Considerable experience was now available with regard to the induction furnace, which claimed a good deal of attention by reason of its simplicity. With regard to the author's arc furnace, he assumed that the only point claimed for his construction was that he was increasing the number of arcs. In the first of such furnaces there was a single arc, then a bottom electrode, and the main point about this particular furnace was that there were three arcs, and that at the bottom of the furnace it was possible to have multiples of three. It might be accepted as a fact that the ultimate furnace would be the simplest furnace, and unless the author could show that he obtained results giving great advantages in regard to economy of operation or quality of material produced, it was impossible to believe that this particular type of furnace would supersede others.

#### Remarkable Evaporation of a Boiler Fire Box

An elaborate series of boiler tests have been under way some time at Coatesville, Pa., under the direction of Dr. W. F. M. Goss of the University of Illinois. Two locomotive boilers have been employed in the tests, one having a firebox of the radial-stay type, hereinafter referred to as the radial-stay boiler, and the other having a firebox of the Jacobs-Schupert type, hereinafter referred to as the Jacobs-Schupert boiler. Both boilers are identical in their general dimensions, which are as follows: Outside diameter of shell of boiler at front end, 70 in.; diameter of shell at throat, 83 $\frac{3}{4}$  in.; number of 2 $\frac{1}{4}$ -in. tubes, 290; length of tubes, 218 in.; inside length of firebox, 109 $\frac{3}{4}$  in.; inside width of firebox, 76 $\frac{3}{4}$  in.

One series of tests was to determine for each boiler the evaporation from the firebox and from the tubes separately. To make such a determination possible the back tube-sheet was extended in all directions to the outside of the boiler, thus forming a diaphragm completely separating the water-space on the two sides of this tube sheet. By this device each boiler was made in effect two boilers, the heating surface of one being all portions of the firebox, excepting the front tube-sheet, and the heating surface of the other being the tubes and tube-sheets. In carrying out the tests each compartment was supplied with weighed water as though it were a separate boiler. The heating surface in square feet of the radial stay boiler was, in the firebox, 179.2, and in the barrel, 2805.1; the heating surface in the Jacobs-Schupert boiler was 201.9 and 2806.5 respectively.

Oil-fired tests have been run on each boiler. Three different rates of power have been employed in each series, the rate of fuel consumption ranging from 800 lb. of oil per hour to 2100 lb. of oil per hour. The total water evaporated from both the firebox end and the tube end of the boilers has ranged from 10,000 lb. per hour to 24,000 lb. per hour, the evaporation per pound of oil being approximately 16 lb. in the tests of lowest power and approximately 14 lb. in those of highest power. In all tests a surprisingly large percentage of the total work is done by the firebox. This percentage is greatest when the rate of power is lowest. Speaking in general terms, at low

rates of power from 45 to 50 per cent. of the total heat transmitted by the boiler is absorbed by the firebox. With increase of power the percentage falls, but the lowest value thus far obtained is approximately 34 per cent.

As the heating surface of the firebox is a comparatively small fraction of the total heating surface of the boiler, it is evident that heat is transmitted from the firebox at rates which are extremely high. For example, results of a number of tests show the evaporation of more than 50 lb. of water per foot of firebox heating-surface per hour, which rate of evaporation is equivalent to the development of more than 300 hp. by the firebox alone. The fact that fireboxes subjected to such conditions could be worked at the rate of power stated is suggestive of new possibilities in boiler design.

#### The Steel Corporation and the Electric Furnace

This interesting comment inspired by the paper of William R. Walker on "Electric Furnaces" read at the recent New York meeting of the American Iron and Steel Institute appears in Metallurgical and Chemical Engineering for June:

"To appreciate the scope and importance of this paper, the position of its author must be understood. Mr. Walker has been in the steel industry almost from boyhood on—as a chemist, in charge of Bessemer and open-hearth departments, in charge of the South Chicago works, as general manager of the Illinois Steel Company, and now in charge of all metallurgical improvements of the United States Steel Corporation. He was one of the first American steel men to see the possibilities of the electric steel furnace. It was Mr. Walker's influence and advice which led the United States Steel Corporation to take up the electric furnace and to make large-scale experiments on the heretofore untried problem of making steel for large-quantity products, like rails, in the electric furnace. It was on Mr. Walker's advice that many hundreds of thousands of dollars have been spent by the Steel Corporation in its three years of experimental work.

"That this was true pioneer work is clearly shown by the one detail of the electrodes. The step from a 5-ton Heroult furnace to the 15-ton size was too big for the amorphous carbon electrode makers. Now their troubles are past. Amorphous carbon electrodes are now made which will not break and which are sold at a reasonable price. But it is significant that if they had been available before, it would have saved over \$150,000 on the single item of electrode cost for the Steel Corporation.

"In view of all these facts, Mr. Walker's unostentatious paper—written with an almost extreme modesty, so characteristic of its author—really assumes momentous importance in its simple statement of the success of the experiment and of electric steel rails. It foreshadows a big future for the electric steel furnace. Clearly the South Chicago experiment was a necessity. But who could have made it, in view of the expense, but a very big corporation? And was it not the same with Gayley's dry-blast experiment?

"Evidently for electric steel refining on a very large scale the ice has now been broken and the credit for this belongs to the United States Steel Corporation and Mr. Walker. Though it is but fair to say that early in June the famous Deutscher Kaiser works in Germany will have done even better by starting a 25-ton electric steel furnace."

The American Railway Association's Bulletin for May 23 shows that the net surplus of idle cars on the lines of the United States and Canada was 116,201, compared with 130,098 two weeks previous and 138,881 four weeks previous. The coal car surplus decreased in the two weeks ending May 23 from 83,512 to 71,068 and the box car surplus increased from 20,626 to 23,298. The flat car surplus increased, but the surplus on miscellaneous cars showed a considerable decrease.

The Phillemac Rolling Mill Company's entire outfit at Woodlawn, near Cincinnati, Ohio, will be sold at auction on the premises, June 17, at 10 a. m., by John Paul McCaslin, the receiver, by order of court. The equipment was built to turn out 80 tons of bars per 24 hours.

## The Economy Steam Turbine

Changes in the Design and the Direction of Steam Flow the Special Features of a New Type Brought Out by the Kerr Turbine Company

In place of the Kerr turbine with nozzle and double cupped buckets, the Kerr Turbine Company, Wellsville, N. Y., has brought out a new type in which the vanes and blades produce a flow of steam parallel to the plane of the

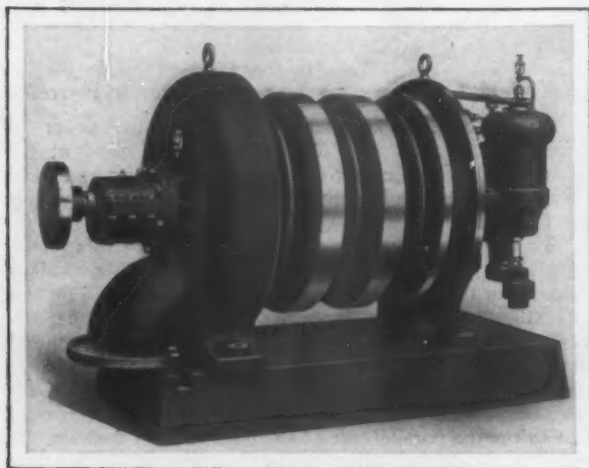


Fig. 1—View with the Casing Removed of the Economy Steam Turbine, Built by the Kerr Turbine Company, Wellsville, N. Y.

turbine shaft. This new type of prime mover was brought out in response to a demand for a greater steam economy than was possible with the older type of turbine. A decrease in steam consumption of from 10 to 15 per cent. in non-condensing service and in some instances as large a difference as 25 per cent. with condensing turbines is claimed over the former type. A view of the turbine with the casing removed is given in Fig. 1, while Fig. 2 illustrates the relative position of the vanes and the buckets. A set of performance curves showing the economy secured with the new turbine is reproduced in Fig. 3.

In making the radical departure from the former design, an increase in the strength of all working parts has also been made and the jet velocity is kept at a low figure by expansion in a succession of stages, usually from two to ten may be found desirable for different conditions of steam pressure and vacuum and for desired steam consumption rates and varying speeds. Referring to Fig. 2, each set of nozzles discharges against a separate bucket wheel, the steam entering the bucket at the side of the wheel and making the usual reversal of direction. One set of nozzles and one wheel constitute a stage and the steam issues from the nozzle in the first stage, impinges upon the first stage buckets, leaves within the first stage casing a considerable pressure to be expanded through the second stage nozzles and imparted to the second stage buckets, and so on through the machine. In this way it is pointed out that the total pressure drop is divided and the energy abstracted from the steam at each stage is comparatively small, the nozzles of the stages being so proportioned in number and size that the steam velocity is equal in all sets.

The cylinder of the turbine is divided into separate stages by separate circular diaphragm castings between the steam and the exhaust end casting. Each of these diaphragm castings contains a single set of nozzles, provides for one bucket wheel and is arched at the center to resist steam pressure to the best advantage. These castings are centered with each other and the two end ones are turned and bored with tongue and groove joints, the weight of the turbine being carried by the feet on the end castings. The bearing cases are also centered by machined faces on the end castings and fall into alignment in the same way as the diaphragms. This sectional construction, it is pointed out, is especially advantageous in dismantling as each individual part is small in size and weight. Two men with block and tackle can dismantle a 500-hp. Economy turbine having

36-in. bucket wheels. The block and tackle is not required on machines with 24-in. or smaller wheels, and on those having 18-in. wheels or smaller, one man can handle the job alone. Steam tightness at the joints and accuracy of alignment of the cylindrical parts of the shell are effected by annular machined tongues and grooves, the latter being packed with fibrous packings laid up in graphite and oil. Continuous stay bolts are passed through drilled holes in the flange of one end casting and tapped in to the flange at the other and serve to bind the sections of the turbine together. Heat radiation is checked by filling the interstices between the stay bolts and surrounding the cylinder and packing the turbine ends with lagging, which is held in place by an annular jacket and end plates of Russia iron. Floating bronze bushings in contact with ground metal seats and held in place on the shaft by the difference in steam pressure in the various stages serve to prevent leakage of steam at the shaft at the steam and exhaust ends and between the different stages. In addition to these bushings at the steam and exhaust ends of the turbine packing glands are also furnished for soft ring packing. Between the packing glands and the metal glands is a chamber which receives the leakage from the latter. A soft packing is used to confine the leakage within these chambers and prevent escape along the shaft, while the leakage through the metal glands at the steam end discharges through a pipe connection to one of the low-pressure stages of the turbine. Leakage of air into the vacuum is prevented by supplying the chamber at the exhaust end with steam, which it is pointed out forms an effective seal.

The nozzles formed by walls within the diaphragms and thin metal vanes die-pressed into shape and cast into the diaphragms are located adjacent to the bucket wheels with axial clearance between them and the bucket. The nozzles are of a form, which it is pointed out has given maximum efficiency with the Economy type of bucket and the vanes are of a metal which is not subject to corrosion or erosion from service conditions. The rotor, which is mounted upon the steel shaft, is made of bucket wheels machined from steel having a tensile strength of 60,000 lb. per square inch. Each wheel is bolted on a three-piece split steel or iron hub, that in turn is fitted to the shaft and kept from endwise or rotary movement by pin keys. A split mitered ring is forced by a lock nut into the bore of the disk and against a turned taper. In this way it is pointed out that a true and rigid connection is secured

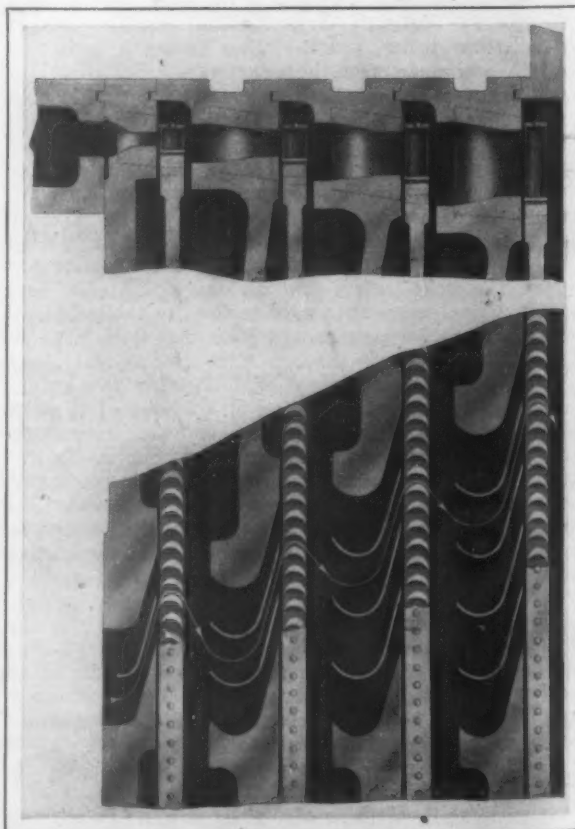


Fig. 2—Diagram Showing the Relative Position of the Vanes and the Buckets and the Path of the Steam Through the Turbine



which renders the wheel and the hub readily removable from the shaft when taking down the turbine. The buckets are of drop forged steel with a hard oxidized surface which is the same as that used in the builder's other turbines and is not subjected to erosion or rust. It is stated

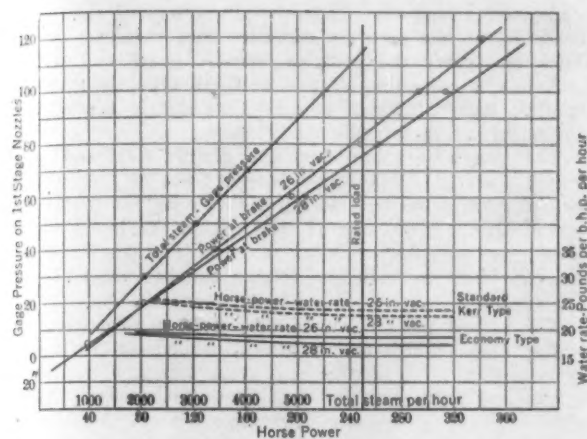


Fig. 3—Performance Curves of the Old and the New Types of 250-Hp. Turbine

that buckets of this finish taken from turbines that have seen over four years of service have shown no indication of wear. To prevent the bucket from working loose the shanks are dovetailed and fitted into drilled and slotted openings in the wheels.

In operation steam is admitted to the turbine through a steam chest provided with ports to the first stage nozzles and with a double poppet valve operated by the governor. The governing mechanism is of the spring loaded and centrifugal type and is made in two styles depending upon the service to which the turbine is to be put. For average service the mechanism consists of semi-annular weights mounted directly upon the turbine shaft and acting through lever connections to throttle the steam valve. On the larger sizes of units, and especially those designed for driving generators where a close regulation is necessary, the governor consists of a set of spherical weights driven through a spiral gear on the turbine shaft and acting upon the valve stem through a relay pilot valve. An emergency governor is also employed to close a valve in the steam line when the turbine overspeeds, thus keeping the valve shut until it is reopened by hand. The main bearings are ring-oiling and self-aligning and are split in half for removal from the bearing case by removing the cap. A thrust bearing and locating collar are provided in connection with the exhaust end bearing to insure the correct position of the bucket wheels with reference to the nozzles and maintain the alignment exactly. On the high speed machines oil is forced into the bearings at a pressure of about 3 lb. by a rotary pump on the end of the governor spindle, the lubricant being taken from a reservoir which supplies the governor.

These turbines are built for condensing and non-condensing service in sizes of from 2 to 750 hp. and in sizes up to 450 hp. for use with exhaust steam. The economy in steam consumption secured by this new turbine is clearly brought out in Fig. 3, which is a reproduction of a set of test curves, indicating performances under identical conditions of an old type of machine rated at 250 b.h.p. and an Economy turbine having the same number and size of wheels. Referring to these curves it will be noticed that with both turbines taking steam at 100 lb. at the throttle at the rated load, the water rate under a 26-in. vacuum was 24 lb. for the old machine as compared with 18.7 lb. for the Economy turbine. With a 28-in. vacuum the water rate was reduced from 23 to 17.2 lb.

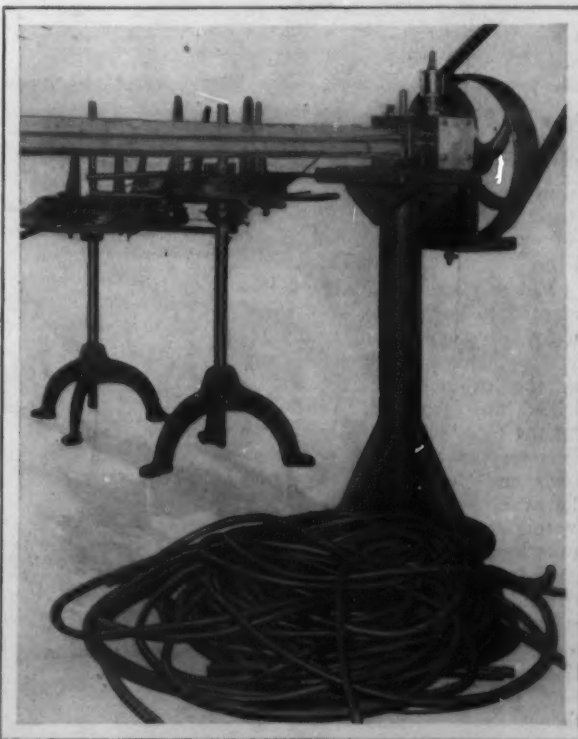
The corporations heretofore known as Alberger Condenser Company, Alberger Pump Company, Newburgh Ice Machine & Engine Company have been consolidated under one management in a new corporation under the laws of the State of New York, to be known as the Alberger Pump & Condenser Company, with office at 140 Cedar street, New York City.

## Canadian Manufacturers Seek Western Trade

A "made in Canada" special exhibition train has started upon a 48-day tour, in which it will cover 6500 miles on the Canadian Pacific Railway system. Among the exhibits may be mentioned the following: Steel rails, Algoma Steel Company, Ltd., Sault Ste. Marie, Ont.; asbestos shingles, slates, sheathings, etc., Asbestos Mfg. Company, Ltd., Toronto, Ont.; cast-iron pipe, special castings of all kinds, car wheels, iron ore, pig iron, Canada Iron Corporation, Ltd., Montreal, Que.; engines, pumps, etc., Canadian Fairbanks-Morse Company, Ltd., Montreal, Que.; iron and steel products, Dominion Iron & Steel Company, Ltd., Sydney, C. B.; engineers' and plumbers' brass goods, James Morrison Brass Mfg. Company, Ltd., Toronto, Ont.; iron and steel products, Nova Scotia Steel & Coal Company, Ltd., New Glasgow, N. S.; gasoline engines, wood and steel tanks, etc., Ontario Wind Engine & Pump Company, Ltd., Toronto, Ont.; enameled baths and plumbers' supplies, Standard Sanitary Mfg. Company, Ltd., Toronto, Ont.; steel and iron products, Steel Company of Canada, Ltd., Hamilton, Ont.; paints, varnishes, white lead, etc., G. F. Stephens & Co., Ltd., Winnipeg, Man.; builders' supplies, Winnipeg Paint & Glass Company, Ltd., Winnipeg, Man.

## Tube Coiling Machine

For manufacturing flexible steel hose, the Wire Specialty & Machine Works, 1108 High street, South Bend, Ind., has developed a new type of tube coiling machine. The output of this machine is a casing consisting of two coils, the inner one of which is made of a very hard half round spring wire, while the other is of soft steel wire.



A New Type of Coiling Machine for Making Flexible Metallic Hose Built by the Wire Specialty & Machine Works, South Bend, Ind.

This machine is capable of turning out about 3000 ft. per day, although if desired it could be run at a higher speed with a corresponding increase in the output.

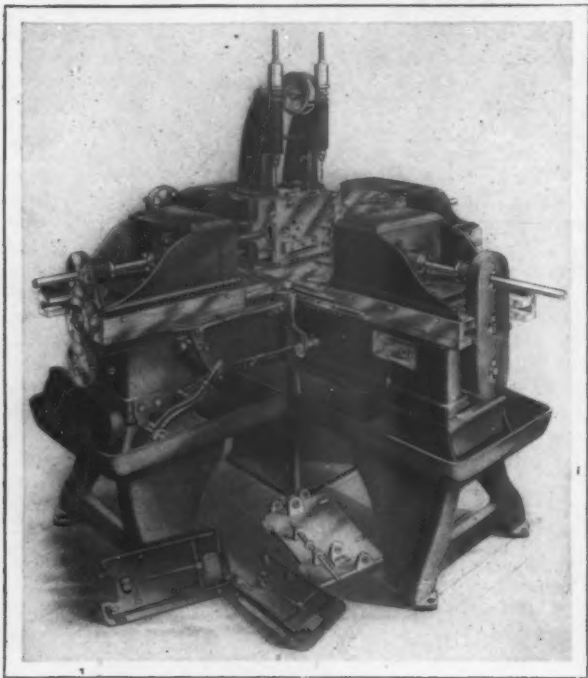
In operation the machine takes the wire for the two coils from the reels shown at the left of the accompanying engraving and passes them through a straightening device, which is so arranged that the tension of the outer coil can be adjusted to any required amount. The tension of this outer wire, together with the pressure of the rolls forces the soft wire into the groove between the coils of the spring wire and thus makes a tight joint.

Alaska advices report the discovery of large tin deposits in the Hot Spring district, Tanana Valley, about 200 miles from Fairbanks.



### New Five-Way Drilling Machine

For drilling pieces such as sewing machine bed plates, phonograph side frames, gun receivers, etc., where drilling has to be done from two, three or four sides, the National



A New Horizontal Five-Way Multiple-Spindle Precision Drilling Machine Built by the National Automatic Tool Company, Richmond, Ind.

Automatic Tool Company, Richmond, Ind., has brought out a new horizontal five-way multiple-spindle precision drilling machine. These machines are designed to drill from two to five directions simultaneously and are intended to turn out accurate work with high-speed drills.

Either plain or rotating tables adapted to carry one, two, three or four jigs and having a change-feed mechanism which enables any of the ordinary metals to be drilled, are furnished. When using the rotating table with two or three-way machines, the operator loads and unloads one jig while the other parts are being drilled. In this way the machines are always busy as the indexing of the table is automatic. Any number of heads within the capacity of the machine can be used, the others remaining idle. For holes up to  $\frac{3}{4}$  in. in depth, the actual drilling time is 30 sec. The machine shown in the accompanying engraving was built for drilling-sewing machines, bed plates containing 19 holes, five of which are counter-bored, in 45 sec., the drilling being carried on from five directions simultaneously. The dimensions of the largest hole are  $\frac{7}{8}$  in. in diameter and 1 in. deep.

The equipment of these machines includes friction-clutch pulleys and an automatic throw-out which stops the revolution of the drills when the heads have returned to the starting point. An endless track encircles the cam drum which is designed to give a fast forward feed, a slower one while drilling and a quick return. In this way all the drills are run at the proper cutting speed and

the maximum allowable feed. The cluster boxes are readily removable so that additional ones can be used on the one machine for drilling different parts. These are equipped with adjustable steel rails which can be easily changed from one drilling layout to another. In this way one machine can have several sets of cluster boxes for different work and can be equipped either with cluster boxes and heads having adjustable rails or with adjustable rails only. These boxes are securely dowelled and fastened to the slides and carry the spindles, spindle gears and idlers. Each box is composed of two sections, securely fastened together, each of which acts as a receptacle for oil for lubricating all the spindle gears, etc.

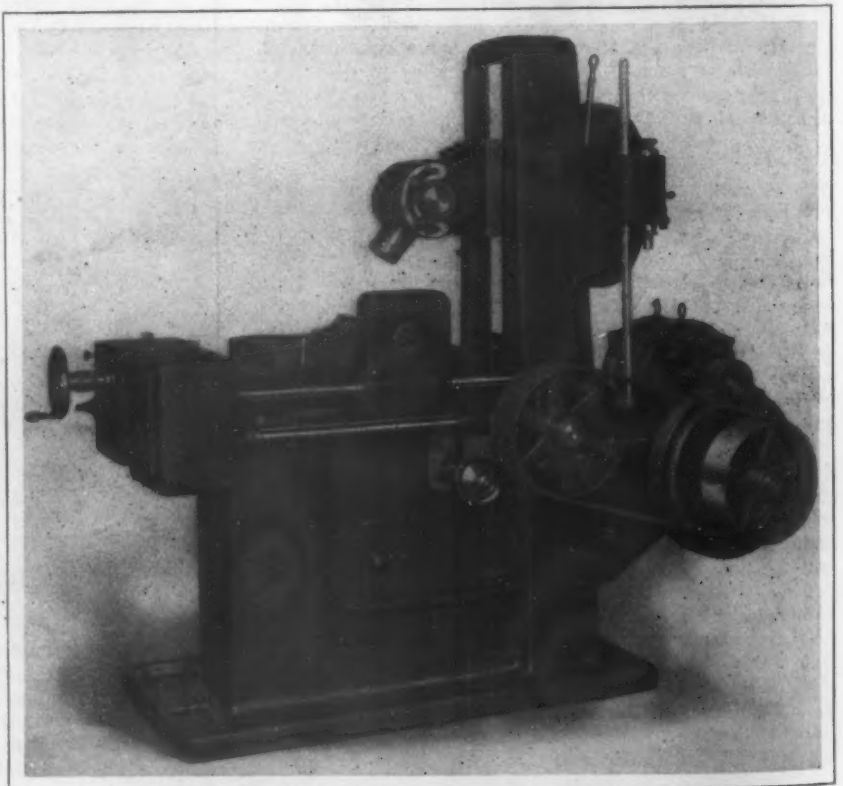
The spindles are hardened and ground steel and have bronze bearings. Ball thrust bearings are also furnished for the spindles as well as adjustable nuts for taking up wear. All the gears are of steel except the intermediate spiral gears for which rawhide is used. The spindle gears, etc., run in an oil bath and all the clutches are made of tool steel.

The bed of the machine is very deep in proportion to its length and width and is heavily ribbed on the inside. In this way it is emphasized great strength has been secured together with freedom from deflection both of which are very essential features where combination drills and counterbores and large drills are used and accurate alignment between the spindles and the jigs is desired. Oil pans which keep dirt and chips from the floor and form a receptacle for oil or cutting compound are also mounted on the bed of the machine.

The power is delivered from the rear of the machine and is distributed by large miter gears to the several ways and by spiral steel gears and rawhide idlers to the driving shafts which operate the spindles in the different drilling heads.

### A New Large Gear Cutting Machine

Improvements have been recently made by the E. J. Flather Mfg. Company, Nashua, N. H., in its standard 40-in. spur gear cutting machine. In the present form, which is illustrated in the accompanying engraving, the



The Improved 40-In. Automatic Gear Cutting Machine Built by the E. J. Flather Mfg. Company, Nashua, N. H.

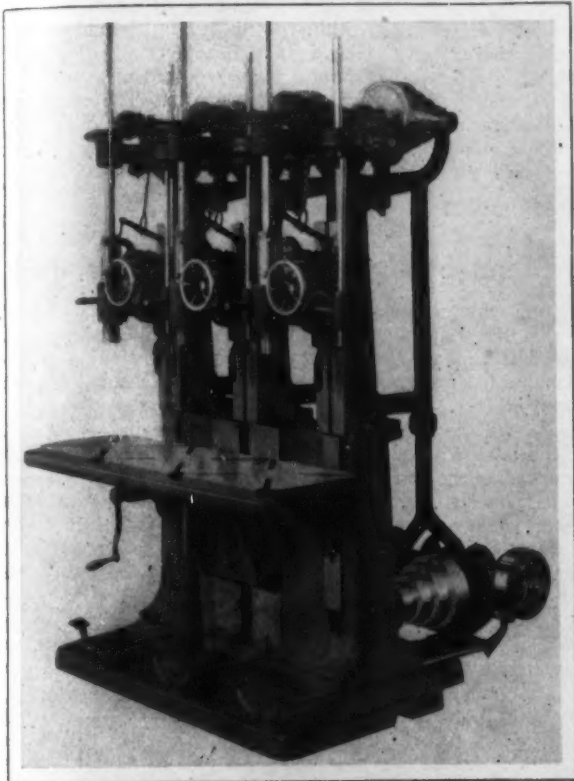
machine is equipped with a bevel gear attachment that is bolted to the work spindle, and other changes include a new design of indexing mechanism, which is now fully in-

closed and is mounted on an easily detachable bracket.

The machine is driven by an endless leather belt from an electric motor, an arrangement which has the advantage of a certain degree of flexibility, adjustments for tightening the belt being made by shifting the sliding base that supports the motor. These machines are built on the unit system, the indexing, feed and speed mechanisms being finished and tested before being assembled in the base casting.

### Sliding Head Gang Drilling Machine

A 20-in. sliding head gang drilling machine has been placed on the market by the W. F. & John Barnes Company, Rockford, Ill. This machine, which is designated as



The Style B 20-In. Sliding Head Gang Drilling Machine Built by the W. F. & John Barnes Company, Rockford, Ill.

style B, is made with two, three, four, five and six spindles, the three-spindle type being the one illustrated. One of the special features is the universal control of the drilling spindle which is secured by the use of the builder's new lower feed mechanism, an arrangement which, it is emphasized, has never before been available on a drilling machine. Four different types of spindle feed, with or without the back gears, with plain lever, with combined lever and worm feed and with self-feed and automatic stop, are available.

The use of the new lower feed mechanism gives the operator the choice of two automatic stops and therefore a combination which can be set to disengage the worm from the worm gear, thus permitting the drill spindle to be returned quickly for drilling or reaming operations, or else to disengage the miter feed gears, which stops the feed, but leaves the worm and worm gear in mesh as will be required in accurate facing and combination tool operations. The machine also has a sliding head, is back geared and is equipped with positive self-feed, automatic stop and return lever for the spindle. The use of the self-feed gives four changes ranging from 0.005 to 0.016 in. per revolution of the spindle, and it is emphasized is adapted to drill or reamer work, drilling in steel or boring in cast iron. It is pointed out that the positive feed increases the capacity of the drill from 15 to 25 per cent. and that there are no belts to slip or to be shifted, all changes being made by the simple movement of a lever. The countershaft, which is mounted on the base of the machine as shown by the accompanying engraving, is driven by a single belt and each spindle is driven entirely

independently of the others so that they can be run either in unison or separately. If desired the countershaft can be furnished with tight and loose pulleys for each spindle instead of the friction clutch controlled by the foot treadles.

The following table gives the principal dimensions and specifications of the three-spindle drill:

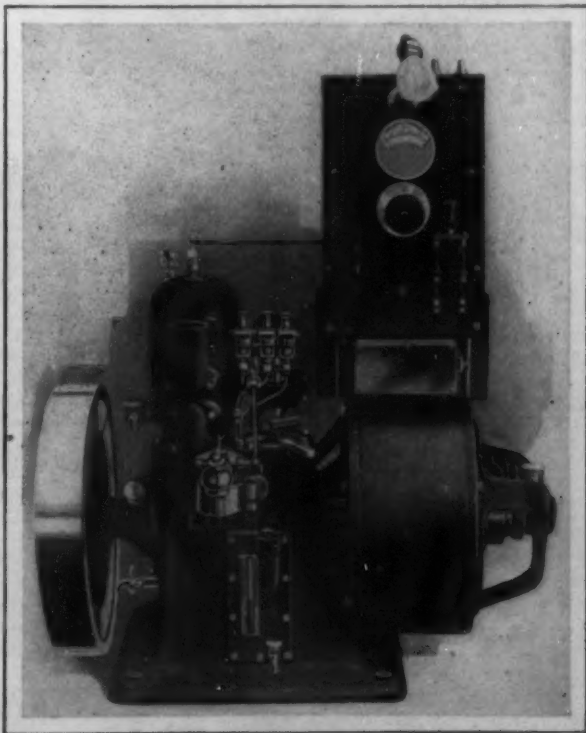
Over-all height, in. ....	73
Distance between spindle centers, in. ....	15
Diameter of spindle, in. ....	1-5/16
Morse taper of hole in spindle, No. 3	9
Vertical travel of spindle, in. ....	12
Vertical travel of table, in. ....	14 1/2
Travel of sliding head, in. ....	14 x 45
Size of table, in. ....	27 1/2
Maximum distance from table to spindle, in. ....	4
Number of cone pulley steps, in. ....	9
Diameter of largest cone pulley step, in. ....	4
Diameter of smallest cone pulley step, in. ....	2
Width of belt, in. ....	6
Diameter of crown gear, in. ....	3 1/4
Diameter of bevel pinion, in. ....	3 1/4 to 1
Ratio of back gears, in. ....	10
Diameter of tight and loose pulleys, in. ....	4
Face width of tight and loose pulley, in. ....	250
Speed of tight and loose pulleys, r.p.m. ....	60 x 48
Floor space required, in. ....	3,500
Net weight, lb. ....	3,700
Domestic shipping weight, lb. ....	

In all the different sizes of machine the depth of the tables, 14 in., is the same, the length being increased 15 in. for each additional spindle. This same increase is made in the amount of floor space required, that for the six-spindle machine being 105 x 48 ft. The builder's geared tapping attachment can be furnished on one or more spindles if desired and sliding chuck and oil pump attachments and a friction reverse motion to the spindle can also be supplied at a slight extra cost.

### Small Factory Lighting Generator

A gas or gasoline engine driven electric lighting generator designed for use in small isolated plants, factory buildings, stores, etc., has recently been brought out by the Federal Electric Company, North Girard, Pa. This machine is built as one unit, a form of construction which requires less floor space and secures proper alignment of the shafts and a reduction of wear and power lost in overcoming friction, with a corresponding increase in the life of the machine and a saving in the amount of fuel consumed.

The engine is of the single-cylinder, two-cycle type and is directly connected to a 2-kw. 110-volt generator. The cylinder of the engine is offset and is 4 in. in diameter



A New 2-Kw. Direct Connected Gas Engine Driven Lighting Generator Built by the Federal Electric Company, North Girard, Pa.

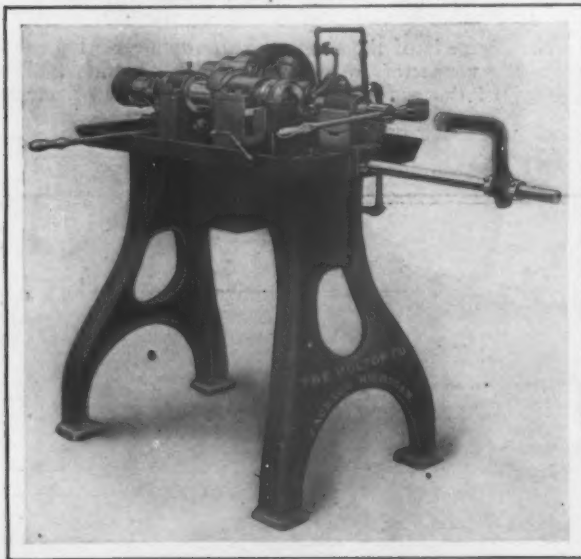
with a  $4\frac{1}{2}$ -in. stroke, the speed being 600 r.p.m. Although this generator is regularly wound for 110 volts it can be wound for a lower voltage is desired. The engine cylinder is water cooled, the supply of water being taken from a barrel, although if desired the connections can be changed and the engine furnished with a pump for drawing the cooling water from a cistern. The crank shaft, which is of forged steel, is of large dimensions and is counterbalanced. The piston has four rings and the connecting rod is of the hinged type with babbitted crank bearing boxes and a hardened and ground crank pin. A special type of governor is used which is claimed to so regulate the engine that it may be operated at full load or with only a few lights without any change in the adjustment being necessary. The main bearings are lined with babbitt metal and are of ample proportions. In designing the engine it is pointed out that particular attention was given to the ports, crank case and cylinder compression so as to secure a maximum of power from a minimum amount of fuel. A 5-gal. tank having connections to the carburetor and an overflow pipe is provided. The lubrication is partly by oil and partly by grease, the latter being used for the main bearings. The rest of the bearings are lubricated by an automatic sight feed system with a 1-gal. reservoir and a gauge glass.

Sheet steel laminations are used for the armature and the commutator is very large. All of the armature and field windings are thoroughly insulated. The switchboard, which is bolted rigidly to the machine, is made of strong insulated material. A voltmeter, voltage regulator and switches are conveniently mounted upon it and there are terminals at the top for connecting the line wires. The ignition is of the jump spark type and dry cells are employed for the starting.

The floor space required by the machine is 19 x 25 in. The maximum height is 40 in. and the complete weight is 725 lb.

### Pipe Cutting-off Machine

For cutting off gas piping, tubing and small bar steel and leaving the ends square and true, the Holton Company, Jackson, Mich., has brought out an improved type of cut-



An Improved Type of Cutting-Off Machine for Gas Pipe, Tubing, Etc., Made by the Holton Company, Jackson, Mich.

ting-off machine. The main features of it are accuracy, simplicity, strength, great capacity and durability. It is emphasized that the hole in the pipe is left full size without burrs or obstructions on the inside, and it, therefore, does not require reaming. Pipes or tubing can be cut any length, just as rapidly as with the rotary cutter commonly employed.

The cutting-off tool is of high speed steel and the spindle and the friction cone pulley are of steel with all the necessary parts hardened and ground. The thrust is taken at the rear end of the spindle and the bearings are of

phosphor bronze. The rotary pump supplying oil or cutting compound to the tool is connected directly to the shaft of the machine and does not require belting or any other means of driving. The machine is characterized by very rigid construction and the material is distributed so as to insure strength at the points where it is required.

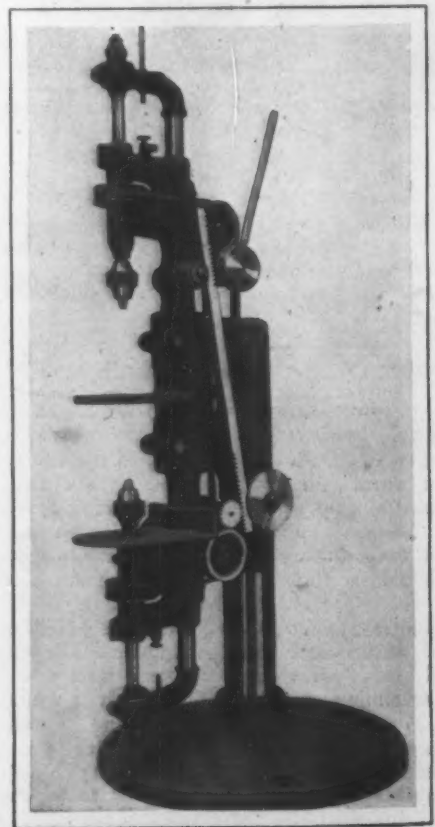
The capacity of the machine includes gas pipe ranging from  $\frac{3}{8}$  to  $1\frac{1}{2}$  in. in diameter and any size of tubing up to a maximum external diameter of  $1\frac{3}{8}$  in. The spindle has a cast-iron back gear running on a phosphor bronze bearing. All of the gears are protected by cast-iron shields.

The machine is driven from an overhead countershaft by a  $3\frac{1}{2}$ -in. belt running over a three-step cone pulley. The tight and loose pulleys on the countershaft are 8 in. in diameter with a 4-in. face and the speed at which it is recommended they be run is from 300 to 350 r.p.m. In this way, it is emphasized that a range of speed sufficient for all sizes of pipe within the range of the machine and ample power for the larger and heavier sizes of pipe or tubing is secured. The floor space required measures 25 x 38 in. and the net weight is about 800 lb. The equipment of the machine includes a pump for supplying oil or cutting compound, together with the necessary piping, wrenches, etc., and an overhead countershaft.

### Metal Shell Counter-Boring Machine

For counter-boring holes in both sides of small metal shells, the Langelier Mfg. Company, Providence, R. I., has designed and built a special type of machine. This machine is of the bench type and occupies a small amount of space.

As will be noticed from the accompanying engraving, it consists of a rigid column set into a wide base which is attached to the bench. This column supports two sensitive drill frames so that the drilling spindles work toward each other, when manually operated by the lever shown or by a foot feed fastened to the bench and operated by a treadle. The main driving pulleys which are not shown are located on opposite sides of the machine and the driving shaft extends through the column and drives both drilling spindles by an endless belt. The two spindles are actuated by pinions meshing into a connecting rack, an



A New Machine for Counter-boring Holes in Small Metal Shells Built by the Langelier Mfg. Company, Providence, R. I.



arrangement which it is pointed out keeps the counter-sinking on both sides of the shell uniform. A  $\frac{1}{2}$ -in. vertical adjustment has been provided for each spindle to give the proper cutting position to the drill, when working on pieces of different sizes. Vertical depth gauges passing through the frame of the machine provide a further means of controlling the accuracy of the work. These gauges can be set to any required distance and are closely regulated by a knurled adjusting screw or anvil against which the tips of the gauges strike.

The following table gives the principal dimensions and specifications of the machine:

Maximum size of drill handled, in.....	3/16
Distance from chuck to top of table, in.....	3 3/4
Distance between spindle centers and edge of column, in.....	1 3/4
Vertical movement of spindles, in.....	2
Height from bench to top of table, in.....	17
Diameter of table, in.....	4 3/4
Vertical adjustment of each spindle, in.....	1 1/2
Space occupied, in.....	15 x 17
Weight, lb.....	114

The work is mounted on a low, flat fixture, set on the top of the fixed table which is located between the drill chucks in such a way that its top is at the exact center of the distance between the drill points. If desired this table can be swung to one side.

## Motor-Driven Band Finishing Machine

For use by machinists and tool makers, the Gardner Machine Company, Beloit, Wis., has recently put on the market a motor-driven band wheel finishing machine. The special feature of this machine is the construction of the wheel employed for doing the finishing together with the method of mounting both wheels on the armature shaft of the driving motor. Fig. 1 is a view of the machine, Fig. 2 illustrates some of the pieces turned out by it and Fig. 3 is a side view of the band wheel showing the way in which the abrasive band is held in position.

In the motor-driven machine which is illustrated in Fig. 1 the armature shaft of a 5-hp. motor serves as the spindle of the machine and carries the two band wheels. Adjustable cast-iron dust hoods nearly inclose the wheels and have an opening at the bottom for attaching the exhaust connection. The movable slide at the front of the hood can be drawn back which is done when long pieces are being finished as this enables the piece to be passed over the wheel and extend down into the exhaust opening at the back of the hood. As will be noticed from the engraving the starting box is located in a convenient position. Although the machine is of the motor-driven type it is also made for belt drive and in Fig. 2 one of the latter is shown in operation together with several representative pieces of work such as tap shanks, spanner wrenches, shafts and gibs.

The type of band wheel used is illustrated in Fig. 3. Cast iron is employed for this wheel and over the peri-



Fig. 2—Specimens of the Work Turned Out by the Machine

phery a layer of felt is permanently fastened. An endless abrasive cloth band is placed around the felt backing. There is an opening in the band wheel and a loop of the abrasive belt is slipped through this. A cross pin is slipped into the loop and drawn tight by a knurled eyebolt which bears upon a very heavy spring. This spring takes up the slack in the band as the latter stretches and thus keeps it tight. In this way the band is kept taut under a con-



Fig. 3—The Type of Band Wheel Employed

stant spring tension until it is desired to substitute a new belt which can be done in about 1 min. The bolt has enlarged ends which will not pass through the eye of the eyebolt. Two sizes of band wheel are made. These are 14 and 16 in. in diameter respectively, the face widths being 3 and  $3\frac{1}{2}$  in.

The Lidgerwood Mfg. Company, 96 Liberty street, New York City, has issued a folder containing interesting data about the Panama Canal. One of the features is an aero view consisting of a relief map with the line of the canal and the relocated railroad line across the Isthmus clearly shown. Interesting facts regarding the history and the construction of this gigantic project are included. In this connection it might be stated that the unloading and conveying apparatus supplied by this company played a considerable part in the construction. *The Iron Age* of October 12, 1911, contained an illustrated description of the cableways used there for handling the concrete and other material.

The Carbo Steel Post Company, Chicago Heights, Ill., announces the appointment of H. T. Hill and associate engineers, 30 Church street, New York City, as its sales representative. This firm will also act as sales representative in Boston, Philadelphia and Atlanta, where branch offices are maintained.

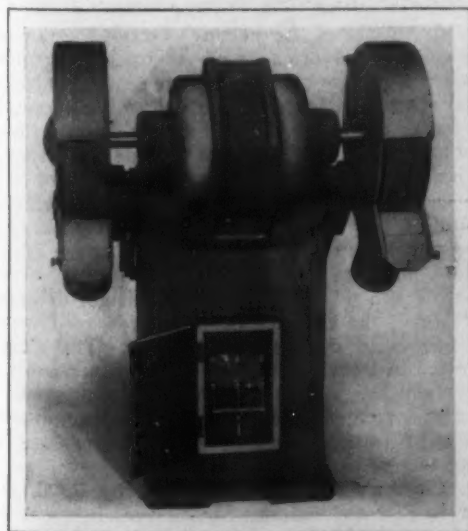


Fig. 1—A New Type of Motor-Driven Band Finishing Machine with the Wheels Mounted on the Motor Armature Built by the Gardner Machine Company, Beloit, Wis.

# Mechanical Engineers' Cleveland Meeting

## The Widening Scope of the Legitimate Activities of the American Society Shown by the Meeting Last Week—Chilling of Cast Iron Discussed

The widening field of mechanical engineering, or rather the growing recognition of the existence of mechanical engineering problems in widely diversified industries was further emphasized in the spring meeting in Cleveland, May 28 to 31, of the American Society of Mechanical Engineers. The meeting was marked by papers dealing with such subjects as the speed regulation of hydro-electric plants, the problems of steam engines and steam turbines, the design of a gold dredge and the equipment of a flour mill. Two papers which aroused considerable interest had to do with chilling cast iron, and new light on the engine indicator diagram was shown by another paper. An independent society which, it is believed, may sooner or later become a division of the larger society held a meeting to discuss one phase of scientific management. This body, the members of which are thought nearly all to be members of the American Society of Mechanical Engineers, is known as the Society to Promote the Science of Management.

The entertainment features were conspicuous, as has come to be the case, but they recognize a demand for the profitable visit to interesting industrial establishments or the opportunity for pleasant social intercourse. Written discussions were numerous, and while the recurrent calls to keep to the time schedules of the plant visitations tended to discourage oral discussions and worked to rob the participants in the meetings of the chance to weigh a given contribution in the light of the personality of the discussor, the monthly publications of the society's proceedings, it is realized, gives abundant place for the careful and studied consideration of the questions.

### Introductory Felicitations

The meetings were held in the Chamber of Commerce Building, which was well adapted for the purpose, a registration of nearly 575, for example, proceeding without annoyance. The first regular session, held Wednesday morning, May 29, was opened with a graceful speech by Past-president Ambrose Swasey, as chairman of the executive committee of Cleveland members, who had arranged for entertainment and general reception plans. The dignity of the occasion was helped by the character and proportions of the meeting room and its decorations, and circling behind Mr. Swasey were President Alexander C. Humphreys, Past-presidents Robert W. Hunt, George Westinghouse, Jesse M. Smith, S. T. Wellman and E. D. Meier; Vice-presidents Wm. F. Durand and Ira N. Hollis; Managers James Hartness, H. G. Reist, Henry Hess and George A. Orrok; Secretary Calvin W. Rice and Mayor Baker of Cleveland. Mr. Swasey mentioned that it was 29 years ago since the society had met in Cleveland and he read from letters received from past-presidents, as follows: John E. Sweet, nearly 80 years old, whom he styled as founder of the society; E. D. Leavitt, president at the former Cleveland meeting, who had been 8 years in continued ill health; Henry R. Towne, James M. Dodge, M. L. Holman, John R. Freeman and F. R. Hutton, who suggested a motto employing the initials of the society, namely, an organization Always Sane, Majestic and Energetic. A letter was also received through his secretary from John Fritz, who on August 21 will be 90 years of age. The reminiscences and comparisons occasioned by the references to the former Cleveland meeting were in a measure anticipated by the local committee, which issued on registration an attractive souvenir book of some 125 pages.

The Mayor in a notable speech of welcome noted the remarkable advances in mechanical and scientific progress, but he questioned if the economic advantages of the progress had kept in step. He urged that unless the economic aspects of the advance of mankind keep pace with scientific processes or mechanical phases of industrial progress we are producing an unstable civilization. President Humphreys in replying emphasized that the engineer

has a distinct mission in this regard. It is these industrial problems which the educated engineer must solve. He agreed that the responsibility was not recognized as it should be. Politicians and engineers, he added, cannot work apart; lawmakers cannot make proper laws without the assistance of engineers.

### Proposed New Grade of Membership

Announcement was made of the adoption of an amendment to the constitution relating to the financing of entertainment features of meetings. It was a question which developed out of a movement to levy somewhat higher dues on members in the vicinity of New York City as an orderly and more definite means of providing for the entertainment side of the annual meeting in early December in each year. The amendment, which carried by a vote of 849 to 54, leaves the question substantially in its present state, the amendment forbidding the increasing of dues of members in any given locality.

The election of 367 members was announced, as follows: Members, 197; promotions to member, 37; associate, 5; promotion to associate, 1; junior, 127.

Past-president Smith read a number of proposed amendments to the constitution providing for a new grade of membership and the election of members by the council, instead of by the members by the present method of a sealed letter ballot. Mr. Smith is chairman of a special committee on the question appointed by a resolution of the council, the other members being F. R. Hutton, E. D. Meier, D. S. Jacobus and George M. Basford. It was urged that the present method was cumbersome, expensive and takes 6 months to operate, while the proposed scheme of election of members by council was simple, certain and rapid. Two adverse votes of members of the council, which numbers in all 22, will suffice to prevent a candidate's admission. The new grade of member is to be called associate member and is to provide a place for the candidate who in age and qualifications is intermediate between junior and member grades. The minimum age limit is 25 years. The classification of membership would then be: junior, minimum age 21 yr.; associate, minimum age 30 yr., one who need not be an engineer but be so connected as to be considered qualified to co-operate with engineers; associate member, minimum age 25 yr.; member, minimum age 30 yr.; and honorary member. An amendment was also proposed making provision for a standing committee on constitution and by-laws.

### Discovery Regarding Engine Indicator Diagram

The first paper of the meeting described a new analysis of the cylinder performance of reciprocating engines and was contributed by J. Paul Clayton of the University of Illinois. Our knowledge of the cylinder performance of reciprocating engines is obtained almost entirely from indicator diagrams. These diagrams provide a measure of the work performed, thus enabling the efficiency or economy of the engine to be determined; they also provide an aid for setting valves, and furnish the basis in steam cylinders for applying Hirn's analysis, for measuring the initial condensation, and for finding the diagram factor for the purposes of design. It appears that the indicator diagram contains in itself the evidence necessary for an almost complete analysis of cylinder performance. The diagram is transferred to logarithmic cross-section paper and a figure is drawn which will be called a logarithmic diagram. From this rational methods are developed of approximating the clearance of a cylinder and of detecting moderate leakage with the engine in normal operation.

Mr. Clayton's paper was discussed by R. C. Stevens, Arthur L. Rice and others. Mr. Stevens in a written discussion considered that the author had drawn unwarrantable conclusions from a series of experiments covering too few engines. There were included only three single-cylinder steam engines. He mentioned the need



of taking into account the leakage of steam directly out of the exhaust or that part that enters the steam chest but by reason of valve leakage passes directly out of the exhaust without entering the cylinder. He said that this loss is enormous even in many new engines and is too little appreciated. He referred to tests that showed steam leakage ranging from 22 to 25 per cent. Valve leakage is, he urged, far more important than piston leakage. The use of an expanding valve, which remains steam tight, produces a saving of 20 per cent. or more as compared with the usual plug valve, this statement based on numerous tests. He doubted that the steam consumption may be approximated from the indicator diagram to within 4 per cent. Mr. Rice expressed the opinion that Mr. Clayton had added greatly to the instruments that are available for studying the operation of steam engines. He thought that there would be difficulty, however, in using the system with engines running at high pressure and high speed. He said that he had discovered in making tests that the logarithmic cross-section paper secured from commercial sources was very inaccurate and as a result he prepared his own paper for the tests.

#### Fuel Side of Gas Power Production

Another one of the important papers of the meeting was that of Thomas R. Weymouth, chief engineer, United National Gas Company, Oil City, Pa., read before the Gas Power Section of the society which held a single session simultaneously with Wednesday morning's general professional session. F. R. Low presided. Mr. Weymouth's contribution was an extended presentation of important problems in the transportation of natural gas, and supplemented these with a table of analyses of gases in the different fields in the United States with formulas connecting the heating value of a gas with its specific gravity and with original formulas for the flow of gas in pipe lines and for the storage capacity of pipe lines. C. N. Cross, instructor of mechanical engineering, Leland Stanford, Jr., University, sent in a written discussion. He, too, had secured a straight line relation between calorific value and the specific gravity, but the slope of the straight line was reversed. Incidentally he intimated something of the character of problems met with in mentioning a single gas well for Los Angeles which developed initial rock pressures of more than 2000 lb. and which gave a lively time in getting it under control every time a rock pocket was opened.

Considerable interest was also taken in a paper by George W. Munro, Purdue University, describing tests on carbureters. A leading point emphasized was that motor vehicle engine performances are different with different carbureters and that the carbureter characteristics would be determined if those of the engine on which they are superposed were known. Approximate engine characteristics were developed for comparison by using the best performance obtained with any carbureter. Attention was also called to the necessity of having available a testing plant, the constants of which are well determined. The paper was discussed by Prof. R. C. Carpenter, Cornell University, and Prof. F. H. Vose, Case School of Applied Science.

Such points were made as that considerable difficulty would have to be overcome in a testing plant on account of the variations in gasoline and the difference in adjustment of a carbureter in humid and in dry atmospheres.

#### Bituminous Coal Producers

A paper describing the apparatus and general arrangement of bituminous coal producers as designed for power was read by C. M. Garland, Camden Iron Works, Camden, N. J. Data on the efficiency of the scrubbers, on the composition of the gas and on operating costs were also given. Prof. O. P. Hood mentioned that Bureau of Mines investigations had shown that CO may easily be mistaken for CH<sub>4</sub>, and said that chemists ought to revise their methods of gas determinations in this particular. E. D. Dreyfus viewed the producer as cumbersome in small units and explained that the unit costs held up in the large sizes, while capacities under 1000 kw. were the present limit with the present price of the fuel. C. W. Baker, editor Engineering News, in referring to the utilization of the heat of the exhaust gases, recommended keeping the temperature of the gases well above 212 deg. F. to eliminate condensation of the water vapor present, and thus prevent corrosion. The author in his closure stated that the water

consumption of the scrubbers was 5 gal. per brake horsepower-hour. He emphasized that producer plants suffered from the belief that low-grade help sufficed and not such careful attention was given to the producer plants as to steam plants. He mentioned a lining which had successfully served a producer for 7 years, the fire not being drawn in this time. If the producer plant is located near a large city the tar recovered, which contains 25 and sometimes 50 per cent. moisture, can be disposed of in connection with paving work, for the making of tar paper and for coating purposes in pipe foundries.

#### New Processes for Chilling Cast Iron

Thursday morning's professional session was opened with a paper by Thomas D. West, the West Steel Casting Company, Cleveland, outlining a series of experiments to determine the effect of different methods of treatment in chilling or hardening cast iron during the process of cooling after pouring the mold. The first experiments showing how to produce mechanically mottled and white iron inside a gray body led to experiments with chillers used in different ways; and with various other heat-absorbing or hardening media, such as air, charcoal, powdered manganese, cyanide, etc. A study was made of the effectiveness of chillers of different thicknesses and of different metals; of the effect of cooling chillers, etc. The experiments indicate, among other results, that the accepted idea of chilling occurring entirely while the molten iron is solidifying is wrong; and they show how stronger grades of iron can be used for car wheels, rolls, etc., and still obtain the desired depths of chill in such castings. They also demonstrate the superiority of air cooling over metal chillers.

Space limitation does not allow for printing the paper in this issue, nor a second paper by Mr. West entitled "Tests of Chillable Iron." The tests relate to the relative strength of gray iron and of partly or wholly chilled iron, showing the best combination in chilled castings, and include tests of chillable iron alloyed with vanadium and titanium.

J. E. Johnson, Jr., manager Lake Superior Iron & Chemical Company, Ashland, Wis., stated that he has given iron with an internal chill much attention. He said that 95 per cent. of the freight traffic of this country is being carried on chilled car wheels. Steel wheels have been widely heralded, but he believed chilled wheels will be used for many years to come. He believed that the only way to make the chilled wheel good was by the use of charcoal iron. However, he said that not all charcoal iron was equally satisfactory. The microscope does not give the clue. H. M. Lane had found in stove plate castings an interior chilled streak which resists the drill. He had found that the chill can be produced when the ladle is slightly damp.

Dr. Henry M. Howe, Columbia University, contributed a written discussion. Mr. West had found that if a cast-iron casting after the outer part has solidified and cooled at a normal rate to somewhat below the eutectic freezing point and thus becomes graphitic, is suddenly withdrawn from the mold and quenched in water, the inside will be of white iron. The fact that the inside of the casting is white though the normal slow rate of cooling extended below the eutectic freezing point, shows that it solidified as white iron. The graphitization of the outside must have occurred in that phase of the cooling by which the gray outside had outrun the white interior at the moment when the quenching occurred. Because the amount by which the cooling of the outside outran that of the inside must have been very slight, we infer that this graphitization occurred in a very narrow range of cooling and presumably below the eutectic freezing point. His further ingenious experiments showed that, if the slow cooling had not been interrupted thus, the interior would have been very gray.

Thus Mr. West confirmed in a very simple and effective way the evidence of Heyn and Bauer that graphitization occurs chiefly immediately below the eutectic freezing point. The usual occurrence of white cores inside of gray iron pigs so often reported is probably due to pressure. If the outside of the casting becomes firm and rigid, the separation of graphite inside it immediately sets up pressure, because the graphite is so bulky, and the existence of this pressure tends to prevent the further



formation of graphite in the parts farther in. In most cases this tendency is resisted by the slower cooling of the interior than of the exterior, slow cooling in itself prolonging the opportunity for the graphitization of the cementite. Thus we have a struggle between slower cooling in the interior, which tends to bring the carbon to the state of graphite, and pressure in the interior, which tends to prevent it from assuming the form of graphite. In the majority of cases the slower cooling has the mastery, and the interior of the casting is as graphitic as the outside. It may often happen that the throwing of a stream of water on the pigs after their outside has turned gray, but before the inside has, or their removal from the sand in cold weather at this point in their cooling may, as in Mr. West's experiments, lead to an internal chill.

Henry Souther noted in the paper on tests that vanadium and titanium had been added in the ladle and that the metal cooled somewhat because of these additions. He regarded it fair to assume that after the addition of these alloys the metal was cooler, therefore chills quicker with less separation of graphitic carbon and a naturally greater strength. He thought it unfortunate that the iron with and without alloying elements was not poured at a similar temperature.

Paul Kreuzpointner, Altoona, Pa., deduced from the one paper that there are several methods whereby a chilled surface may be obtained in cast iron, the depth of the chill depending on three factors: conductivity of the chilling medium, continuity of contact of the chilling medium and quickness of action of the chilling medium, always provided the chemical composition is favorable to obtaining good results. Wrought iron would seem to be the least adapted to act as a chilling medium because of the presence of the cinder found in all wrought iron and which acts as an obstruction to the rapid traveling on the heat from one particle to the other. Theoretically, tool steel would seem the best chilling medium of the metal class because of its freedom from interposing films of slag or graphite between the crystals. In every-day practice this is out of the question. We have to fall back on cast iron or a suitable stream of cold air.

P. Munnoch regarded Mr. West's experiments as corroborating the work of E. A. Custer in respect to the production of the chill structure after the metal has solidified, castings made in chill molds showing no signs of chilled structure, provided the castings are removed immediately after casting. The effect of a chill placed in a mold has a great effect at the beginning of the chilling period, but as the temperature of the face of the chill block becomes heated the chilling effect is reduced considerably before the end of the chilling period, whereas the effect of air chilling will continue equally efficient during the whole of the chilling period, this fact accounting for the better results obtained with air cooling by Mr. West.

James A. Beckett, Hoosick Falls, N. Y., said that a long experience in chilling cast iron had demonstrated that for surface chilling no better chiller has been found, when cost and wearing qualities are considered, than the cast-iron chiller, which is easily made and a fairly good absorber of heat, and when of the right composition will keep its shape longer than any other medium used for a permanent chiller. The efficiency of any chilling medium may be increased by the selection of a mixture of irons which have the tendency to a greater increase of combined carbon on remelting than is found in ordinary foundry irons. Irons of a given analysis made from certain Eastern ores have this tendency to a greater degree than most Southern irons of the same analysis. For many years plow castings have been made by using the chiller for the cope of the molds; in the upper surface was formed a receptacle into which warm or hot water was poured just before the iron was poured into the mold. The effect of the increased temperature of the chiller was to reduce the depth of chill in the casting.

The application of a jet of air to aid in the chilling process is a difficult matter, which will prove expensive in the long run, and is not likely to come into use except in special cases. In reference to Mr. West's statement that "graphitization having once taken place in the crust or body of a hot casting, no sudden cooling can restore the carbon to its original form; only by remelting can it be so transformed as to have a chilled or white iron struc-

ture," he said is not so positive in its action as Mr. West assumes, except in the case of gray iron. White iron used in the malleable iron industry, when subsequently annealed until practically all its carbon is in the graphitic form, may be restored to its original state, in which practically all its carbon is combined, by heating it to a cherry red and quenching it in cold water.

### Large Steam Turbines

The professional session of Friday morning opened with a paper by Prof. A. G. Christie, assistant professor steam engineering, University of Wisconsin, dealing with the present state of development of leading types of large steam turbines, some details of construction, the commercial results obtained and some new uses to which steam turbines have been put. It also pointed out the probable tendencies of steam-turbine development. The different types were also compared on the basis of efficiency as shown by published results of tests. The present status of low-pressure turbines, turbo-compressors, turbo-driven pumps, geared turbines and marine turbines was discussed briefly.

Carl Geo. de Laval referred to the new prime mover recently developed in Sweden. It was designed by Messrs. Ljungstrom, Stockholm. It is a radial flow reaction turbine with steam entering between two disks passing from center to circumference between concentric blading rings. These two disks revolve with their shafts at the same rate of speed but in opposite directions. At the end of each shaft the electric generator is attached. The relative speed of each blade becomes double the amount of the ordinary reaction turbine of the same rotative speed and diameter with the consequent result that the blade rows become only one quarter as great. The first turbine was of 500 kw. capacity at 3000 r.p.m., showing an efficiency of 71.8 per cent.; steam consumption of 8.75 lb. per brake horsepower hour, with 175 lb. absolute steam pressure, 250 deg. superheat and 28.5 in vacuum. Sizes as large as 7500 kw. have been designed. The Ljungstrom 1000 kw. machine gave 74.7 per cent. efficiency, taking steam in front of throttle valve and 76.9 per cent. behind the throttle valve, with steam at 162 lb. pressure and 3000 r.p.m. and 11.55 lb. of steam per kilowatt hour or 8 lb. per brake horsepower hour.

Clarence P. Crissey, General Motors Company, Detroit, said that the speed of the turbine cannot be neglected in making comparisons on which to base opinions as to types. Either general type is benefited by an increase of rotative speed and it is almost certain that in the future the speed of all types will not differ materially for machines of a given rating and service. Too much reliance must not be placed on efficiency ratios because first cost, reliability, sustained economy, life and operating expenses are such important factors.

E. D. Dreyfus, Westinghouse Machine Company, East Pittsburgh, emphasized the necessity of establishing some method of rating and rules of conducting tests of this type of power generating unit, that is, including the turbine and generator as a whole. Francis Hodgkinson, mechanical engineer, Westinghouse Machine Company, East Pittsburgh, said he had yet to learn of a case where the blades of a turbine were destroyed as a result of centrifugal force. He mentioned that contrary to a common belief, best performance of the bearings of a turbine was obtained when they were warm, say 150 deg. F., the work done on the oil in overcoming cohesion being then minimized. He argued for a standard method of rating basing capacity on continuous load and having the maximum efficiency at some definite fraction of this load.

C. V. Kerr, chief engineer, McEwen Brothers, Wells-ville, N. Y., also spoke in favor of a standard rating and suggested as a point of design, in the effort to minimize or eliminate erosion of turbine blades in a given part of the turbine, a study to distribute equally over the stages the transfer of energy, keeping in mind, for example, the greater density of the higher pressure steam. A motion was then made to request the Council to consider the question of a standard method of rating steam turbines and the surprising situation arose in that a second to the motion failed to materialize though the idea seemed unquestionably popular. It appears to be the case though no explanation was made in the open meeting that the subject comes within the purview of the Power Test Committee of the society.

A paper was read by Prof. G. A. Goodenough, professor

of thermodynamics, University of Illinois, on thermal properties of steam, developing a formula for the specific heat. In discussing this paper, Prof. F. E. Cardullo of New Hampshire College deplored the tendency of some writers to regard thermodynamics as a branch of applied mathematics and advocated approaching the problem from the physical standpoint. He showed by a diagram that the heat imparted to steam consisted of three parts, namely that expended in increasing the kinetic energy of the molecules, in separating them and in breaking them up into their constituent atoms. It is possible to compute each of these separately to combine them into a rational expression for the specific heat.

The reduction in temperature of condensing water reservoirs due to cooling effects of air and evaporation was discussed in a paper by W. B. Ruggles, Ruggles-Coles Engineering Company, New York. Tests were made to determine the heat radiation from a cooling reservoir of about 6½ acres at the Crescent Portland Cement Company's plant at Wampum, Pa. The amount of heat delivered to the reservoir from the engines and compressors was measured by hourly readings for power and vacuum and the reduction of temperature, due to pumping in fresh water from the Beaver River, and by rain was also taken. By frequent readings of temperature of tail water, intake water and air, the cooling effect of air on a unit of surface of water per unit of difference of temperature was determined. The author suggested that in the northern part of the United States with engines using 15 lb. of water per hp.-hr. and a vacuum of 26 in., a reservoir having a surface of 120 sq. ft. per horse-power would be ample for cooling and condensing water.

The last professional paper to be read was that of E. F. Miller and A. B. Carhart describing experiments made at the Massachusetts Institute of Technology on the discharge capacities of safety valves. The underlying purpose had been to improve the design of two types and the views given, Mr. Carhart explained, were not to be understood as offering something which could be adopted but as indicating desirable lifts and shapes of orifices. Incidentally he described how Prof. Miller had to take the tests in the summer and with his face wrapped in flannel secure temperature readings in a steam-filled atmosphere at 165 deg.

The formal close of the meeting came with the offering of extended resolutions of appreciation of the entertainment features of the meeting by Prof. Greene seconded by S. McC. Marshall, Col. E. D. Meier and Secretary Rice.

#### Entertainment and Social Features

The social side of the meeting was prominent, as already stated. It took definite shape in a notable reception Tuesday afternoon at the home of Mr. and Mrs. Ambrose Swasey. Tuesday evening was given over to an informal acquaintance meeting, enlivened by vaudeville artists. Luncheon was provided Wednesday and Friday by the local committee, and plant visitations under pleasant auspices had been arranged for Wednesday and Friday afternoons, including such conveniences as special trolley cars, special trains or private automobiles as the conditions dictated. A remarkable lecture was delivered Wednesday evening by Dr. Dayton C. Miller of the Case School of Applied Science, on the photography of sound waves. A steamship of exceptional appointments was chartered for the outing of Thursday afternoon and the formal social event of the meeting was a reception and dance Thursday evening at the Colonial Club. It will be impossible to describe the interesting factories and works visited, few individuals indeed being able to take in more than three or four, but it is worth while to say that in a number of plants many believed they could see great opportunities for improving processes and generally increasing the efficiency of production.

It is thought that Baltimore will be the place for the spring meeting of 1913.

Some of the plants which had courteously been thrown open to the visitors were the following: Pennsylvania Company's ore handling equipment, Peerless Motor Car Company, Warner & Swasey Company, Brown Hoisting Machinery Company, Winton Motor Car Company, White Company, National Acme Mfg. Company, American Steel &

Wire Company, the last company supplying a special train for the purpose; Wellman-Seaver-Morgan Company, Akron, and the Goodrich Rubber Company, Akron.

### Mnemonic Symbols for Stores

Simultaneous with Thursday's general professional session of the American Society of Mechanical Engineers, a meeting was held by the Society to Promote the Science of Management, Frank B. Gilbreth in the chair. The meeting was called to consider a paper by Howard G. Benedict, secretary A. J. Deer Company, Hornell, N. Y., entitled "Mnemonic Symbolizing of Stores Under Scientific Management." It was discussed by Carl G. Barth, Philadelphia, whose explanation that the system hardly at all coincided with his understanding of the development of F. W. Taylor's idea, was not concluded at the enforced adjournment of the meeting to participate in the Mechanical Engineers' afternoon's cruise on Lake Erie. Mr. Benedict's paper, which he has copyrighted, is available in pamphlet form and may probably be obtained on request by those especially interested. It is difficult to review the paper in a few words, as it showed how groups of two, three, four and even five letters can be employed to describe definite materials in storage, the letters being selected as a rule as the initial letters of the materials in store or having some other relation calculated to assist the memory in ascertaining either the letters for a given material or the material corresponding to a given combination of letters. Mr. Barth brought out a somewhat different method of employing symbols, his scheme being rather a systematic combination of letters which would assist the memory chiefly because of a knowledge of the system employed. In short, his system would not require so much the use of initial letters for materials or subdivisions or character of materials, but the combination would all be made on an easily remembered system.

### The Eight-Hour Bill Passed

The Senate, by the non-partisan vote of 49 to 11, passed the eight-hour bill, May 31. The measure, which has already passed the House, provides that on all Government contracts the labor shall be limited to eight-hour days for the workmen employed.

Only one Democrat—Mr. Percy of Mississippi—voted against the measure. The ten Republicans who opposed it were Mr. Bradley of Kentucky, Mr. Dillingham of Vermont, Mr. du Pont of Delaware, Mr. Gallinger of New Hampshire, Mr. Heyburn of Idaho, Mr. Oliver of Pennsylvania, Mr. Page of Vermont, Mr. Root of New York, Mr. Sanders of Tennessee, and Mr. Wetmore of Rhode Island. The vote was interesting chiefly as showing the remarkable change of sentiment that has come in the Senate in the past two years.

Efforts to amend the House bill generally failed. An amendment proposed by Mr. O'Gorman of New York went the same road. It authorized the President to suspend the penalties in the bill for exceeding eight-hour days in case of floods, fires and other disasters. The most important amendment adopted in the Senate was that exempting work on the Panama Canal from the provisions of the bill until the first construction work is completed. After that the ordinary work of repairing the canal will be treated like all other Government contracts. It is stated that the bill will be signed by the President.

It is announced that the Portland Trade School, Portland, Ore., will have five or six young men to place in the different shops of that city by the end of July. They have been in the school for the past three years, and it is suggested by the United Metal Trades Association of the Pacific Coast that "boys who have enough ambition to work for three years for nothing in a school simply to learn a trade ought to be better than the average apprentice who seeks a position in a shop." It is added that many of the mechanics coming from the East to the Pacific coast are not what is desired because they have been working in shops where they have been taught but one thing and are not equipped for positions in jobbing shops.



# THE IRON AGE

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## The New Competition

A feature of a recent day in the United States Steel Corporation dissolution suit was the story of the Bridge Builders' Society. A witness who was called in aid of the Government's contention against the American Bridge Company was led to tell on cross-examination something of the methods followed by the above organization of 25 of the leading independent fabricating companies of the country. In an article in the *World's Work* Arthur J. Eddy, attorney for the Bridge Builders' Society, tells how it does its work. He defines the basis on which it is organized and on which thus far it has enjoyed immunity from Government interference and even, reputedly, a quasi endorsement of a representative of the Department of Justice who has attended some of its meetings and examined into its plan of cooperation.

Mr. Eddy tells us that the first and vital step in the new competition is the adoption of the open price policy. That this point may be made emphatic we reproduce, with the italics of the author, his setting out of the characteristics of the old and the new regimes:

The *secret* price is the mark of the old—*false* competition.

The *fixed* price is the mark of the illegal combination—*suppressed* competition.

The *open* price is the mark of the new—*true* competition.

In discussing the open price plan, Mr. Eddy admits that the steps necessary to establish it among manufacturers whose product is sold to jobbers and dealers would be different from those required in an association of firms producing only to specifications, each contract differing from all others and calling for a special price or bid. At the same time he considers the difference to be largely in matters of detail. He takes up the case (which is that of the Bridge Builders' Society) of a set of manufacturers whose output is altogether contract work, where each unit of output is made for special service in a special place, and therefore built to order—for example, a steel bridge, a turbine, an engine, a printing press. His directions are as follows: First, form an association. Hold all meetings with open doors. Record every action taken and keep records where any public official in the performance of his duties may have easy access to them. Concerning the work of the so-called lunch associations, he considers that the statement "My price is so-and-so," commonly made at such meetings, may create a moral obligation, suggesting the conclusion that such obligation, being inferred from the results, might be a ground for government interference. He grants that it probably would not be illegal for manufacturers to meet and compare costs and prices, for the purpose of preventing disastrous competition, and of getting a reasonable return for their products; but he adds that the extent to which such frank and straightforward efforts will be held legal depends on the application the courts may make of the principles laid down in the Standard Oil and Tobacco cases. This is pretty close to a description of the procedure in the steel trade previous to May, 1911, and Mr. Eddy's uncertainty as to its legality is just that which was inspired by certain political activities of last year that eventuated in the action for the dissolution of the Steel Corporation. Mr. Eddy attaches much importance to the keeping of full records of all that is done in a cooperative movement. "The one safe course," he says, "is to

have nothing to do with any conference or association, the objects of which are not clearly expressed in black and white and the proceedings of which are not fully preserved." Having the Bridge Builders' Society in mind, he shows how, with a central office and a secretary, such an organization can establish the open price by filing with the secretary (1) all inquiries, (2) all bids, (3) all contracts. The information contained in reports of inquiries is not interchanged, but from reports of inquiries the secretary makes up a weekly bulletin of information indicating the amount of business hanging over the market. The second feature of the scheme, that of promptly sending to each bidder a copy of every other bid, is the one that will naturally meet with incredulity, and the most surprising thing about it is that any bidder may revise his bid, provided the new figure is immediately filed for transmission to other bidders. Still more surprising is the statement that this procedure does not result in fiercer competition. The very secrecy of the old agreements on fixed prices, it is argued, led to violations due to the suspicion that others were doing so; but we are told that the agreement to tell others what one has done can be kept and is kept, and that in practice the very liberty members have to cut and slash as they please eliminates the worst features of the old cut-throat competition.

Without going further into the detailed workings of the new plan, we note Mr. Eddy's admission that it takes months of patient effort to educate all members of such an association to the point of frank and prompt compliance with the requirements of the open price policy; also his claim that it cures many of the evils of what he terms the "old competition." Naturally there will be skepticism as to the permanence of such a plan. Its excess of openness seems too Utopian to last. And we are not at all sure that its very virtues would not make it a shining mark for some administration bent on restoring in every phase the "competition of our fathers." What is of special interest about it is that the one conspicuous organization which is working under it enjoys a charmed life, while the "Gary dinners" are made a chief ground of the Government's petition for the resolution of a great corporation into its elements. The legality of any form of "cooperation" would seem to turn very largely, in the view of the present Department of Justice, on the participation in it of any representative of "big business."

### A New Export Record

April was the banner month for iron and steel exports. The report just issued by the Bureau of Statistics of the Department of Commerce and Labor giving the figures of our foreign trade for April shows that the iron and steel exports in that month not only made a great gain over March but much exceeded the figures attained in any previous month in the history of this country. The total value of the exports of iron and steel and manufactures thereof, not including ore, was \$26,789,853, which is \$2,315,054 greater than in March. The month making the next largest record was April, 1911, when the value of similar exports was \$24,917,056. Thus the month of April just past exceeded the next largest month by \$1,872,797.

Turning to the commodities for which quantities are given, it is found that the April exports totaled 257,975 gross tons, against 217,991 tons in March. The highest previous tonnage record was that of April, 1911, when

the exports aggregated 227,732 tons. In 1911 there were two months in which the exports exceeded 200,000 tons, namely, March with 215,677 tons, and April, 227,732 tons. Thus far this year the months of February, March and April have each exceeded 200,000 tons, the exports for February having been 203,666 tons, March, 217,991 tons, and April, 257,975 tons.

It is interesting to note that the increase in exports from this country is not at the expense of other iron and steel exporting countries. Statistics printed elsewhere in this issue show that both Germany and Great Britain have made gains in their exports. The world's trade in iron and steel is thus indicated to be steadily expanding.

### Machine Tool Stocks and Prices

Prices in the machine tool trade are stiffening in a manner which is probably the precursor of an advance over the present lists. The manufacturers have not changed their schedules in the dull times, but in a great many instances concessions have been made which have amounted to a reduction. In cases of large purchases such discounts have sometimes run into considerable figures. While price cutting has been of small consequence as compared with that of similar periods in the past, yet the tendency resulting from the operation of the law of supply and demand naturally has been downward. Unless the curve of prosperity deviates largely from previous wave lines, the machine tool trade, in common with all other branches of industry, has come to the end of its series of dull years. It seems doubtful if any influence, political or otherwise, can hold back a revival of business. As overproduction and an overextension of credits must cause a serious slump, just as surely does a protracted period of under production and of depletion of stocks, coupled with extreme conservatism in the matter of credits, bring about an improving market. Prominent machine tool builders are already working out new price lists, which will show a sharp increase, and while the new prices may be deferred, they will be a factor of the not distant future. The reason for the advance is not so much to increase profits, in comparison with those of 1906-1907, but to give an equivalent profit. Almost any machine tool of the 1912 model costs more to build, for several reasons, than its predecessor of 1906. With the price the same the customer is now getting more for his money. Another very important phase of the present situation lies in the fact that the country is by no means overstocked with machine tools for immediate delivery, nor are the storehouses of manufacturers and dealers becoming more crowded.

Buyers of machinery do not seem to realize the conditions in the trade, though they have been told what they may expect when the buying movement asserts itself. The absorption of stocks will be very much more rapid than is generally understood at the present time. The machine tool manufacturers, taking the industry as a whole, are probably working at between 60 and 70 per cent. of maximum production, and at this rate are not increasing the stock of available machinery. With this the case, an increase to 100 per cent. capacity will be inadequate to take care of a rush market such as will come when the country is swept by the inevitable wave of maximum prosperity. Buyers of equipment will be demanding immediate



shipment, but all excepting the early comers will have to accept belated deliveries. It will be 1906 over again, or worse.

In the face of this we find that of the hundreds of large users of machine tools who have plans for increased equipment, the great majority are procrastinating. Many of the managing officers of these companies will agree, in personal argument, that business is already better and should be extremely good within a short time. Some of them make the tariff a reason for delaying heavy expenditures of money, yet they do not lay extreme stress upon this factor. One hears the crops spoken of as a supreme influence. A long series of years of great harvests has enriched the country immeasurably, in contrast with previous decades the prosperous years of which were interrupted by crop failures that impoverished the agricultural districts and seriously affected business generally. The enormous growth of the country in population and wealth has created a latent demand—in other words, a demand which may be added to that of six years ago. It is safe to assert that the capacity of American machine shops has not increased beyond the ratio of the natural demand for machine tools, and probably has fallen behind. Yet buyers continue to put off their purchases of machinery and other mill and shop equipment. Those who buy now will buy cheaper and will have their works in position to take full advantage of the rich returns of good times.

## Correspondence

### Crucible Melting Furnace Record

*To the Editor:* In *The Iron Age* of May 16 the record is given of a crucible melting furnace which had run 26 months and 10 days. This is an exceedingly good run, but does not break any record. The Columbia Tool Steel Company, Chicago Heights, Ill., has a furnace which has run 34 months and 16 days and has made 4773 heats to this date. The furnace is still in fair condition and making its six heats every 24 hours. It has run night and day for this entire period and has never had the heat off, probably not varying more than 500 deg. in all inside the furnace since it was started nearly three years ago. We will give you complete record on the run of this furnace when we decide to let it down, as we are quite sure it has already broken the world's record.

E. T. CLARAGE,

President Columbia Tool Steel Company.

CHICAGO HEIGHTS, ILL., May 29, 1912.

### Gain in British Iron and Steel Exports

In spite of the coal strike, the iron and steel exports of Great Britain increased in the first four months of 1912 over the total for the corresponding period of 1911, being 1,615,337 gross tons against 1,520,504 tons. The values were £15,127,506 and £14,896,808 respectively. The April tonnage fell below that of 1911, being 300,816 tons against 391,694 tons. Tinplate exports for the first four months show some falling off this year, having been 161,632 tons against 173,118 tons.

British imports of iron and steel in the first four months of this year were 592,467 tons against 620,025 tons to April 30, 1911. There was a falling off in sheet and tin plate bars from 124,542 tons to 88,563 tons in the first four months. The imports of iron ore were 1,865,447 tons this year, against 2,485,363 tons in the first four months of 1911.

The Deforest Sheet & Tin Plate Company, Niles, Ohio, is enlarging its cold-rolled department and installing a new galvanizing and dipping plant, with new cranes and other accessories. These improvements will about double the galvanizing and dipping capacity.

### Edgar Thomson Improvements

The Carnegie Steel Company has made definite plans for large extensions and improvements to its Edgar Thomson rail mills at Bessemer, Pa. When these are completed the Edgar Thomson rail mills will again occupy a commanding position as makers of both Bessemer and open-hearth rails. At present there are three rail mills at Edgar Thomson. No. 1 is running on standard sections, No. 2 has been on sheet bars for some time, while No. 3 has been rolling light rails. No. 2 is the original rail mill at Edgar Thomson, having been built in 1872-73; this mill will be torn out, the present No. 1 mill becoming No. 2, while a new No. 1 mill will be built for rolling standard sections. The present blooming mill will be reset and will be supplemented by two stands of rolls of four passes. This will naturally require new soaking pit furnaces, and it is the intention to throw the old ones out and build entirely new and sufficient furnaces to take care of the Bessemer and open hearth capacity.

The Bessemer converting department, which contains four 12-ton converters, will not be disturbed, but the supply of steel will be increased by the erection of 14 60-ton open-hearth furnaces. There are 11 blast furnaces at the Edgar Thomson works, making about 135,000 tons of pig iron per month, which will supply the present Bessemer plant and the new open-hearth plant with all the metal both will need. The new open-hearth works will have a monthly capacity of about 55,000 tons of ingots, and the Bessemer capacity is 80,000 tons per month, so that the combined capacity in Bessemer and open-hearth steel for the new and enlarged Edgar Thomson works will be 135,000 tons per month.

A new and enlarged storage yard will be supplied to take care of the increased output of the plant. This yard will be highly organized and will contain complete crane equipment, electric lifting cranes, depressed tracks and other new and most modern equipment and features. It will occupy the site of the present yard, with as much and possibly more additional space.

The open-hearth plant and the soaking pits will be erected by the Carnegie Steel Company itself, while contracts for the new rail mill and the additional stands for the blooming mill will be placed outside. In 1910 a splice bar mill was added to the Edgar Thomson plant, having a capacity of about 7500 tons per month. These extensive improvements and additions it is estimated will cost from \$7,500,000 to \$8,000,000. Work will be started as soon as possible and pushed rapidly to completion. The new Edgar Thomson rail mills will then have a daily capacity of about 4000 tons of Bessemer and open-hearth rails, making the plant the largest producer of rails in the country.

### Alabama Consolidated Company's Finances

Stockholders of the Alabama Consolidated Coal & Iron Company met at Baltimore Friday, May 31, to take action on a plan to avert a receivership in view of the fact that a note for \$330,000 held by the Baltimore Trust Company was overdue. The note is secured by \$1,250,000 of improvement refunding 6 per cent. bonds. Joseph H. Hoadley, chairman of the board of directors, urged that an extension be granted on the note, intimating that a well-known steel manufacturer might become interested in the company. The trust company has advertised for sale the bonds it holds as collateral, but it is stated that a number of preferred stockholders have agreed to pay an assessment up to \$10 to avoid the sale of the bonds. In connection with the Baltimore meeting, the statement was made that from present indications the proposed consolidation with the Southern Iron & Steel Company will not be put through.

The Franklin Boiler Works Company has closed its shops at Troy, N. Y. So far as is known, there is no intention to continue the manufacture of water-tube boilers.

The Perry Iron Company, operating a blast furnace at Erie, Pa., has increased its capital stock from \$240,000 to \$500,000.

# Per Capita Production of Pig Iron

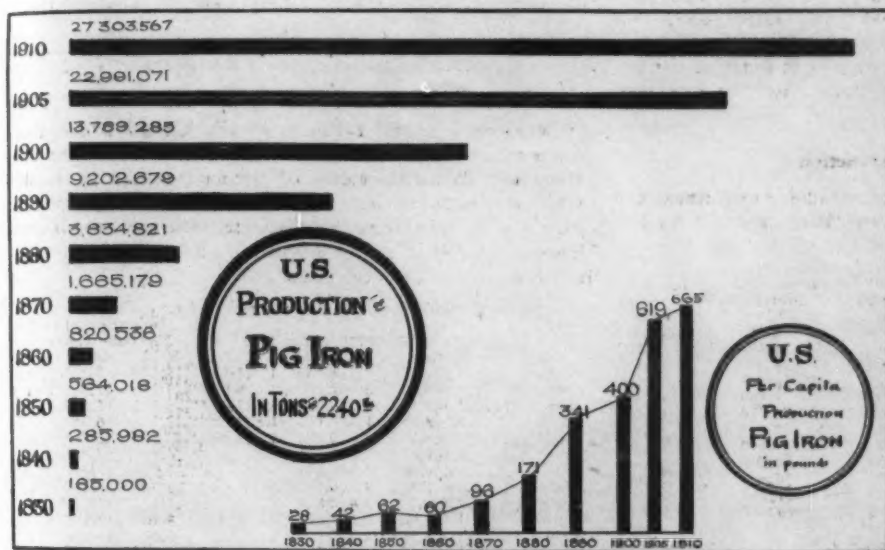
A Graphic Representation for the Period  
1830 to 1910—Coke May Be the Limiting  
Factor in the Next Forward Movement

BY WILLIAM S. PILLING\*

In 1906 a most interesting chart was prepared by L. S. Witherbee, then a student at Yale University, setting forth in graphic style the production of pig iron in the United States in decades, commencing with 1830. The

of pig iron and consequent advance in values will be due to the scarcity of raw material rather than to inadequate furnace capacity. This may seem improbable at the moment, in view of the abundant supplies of ores both domestic and foreign. It is, however, a well-known fact that a marked increase in the production of iron over normal figures brings about increased cost; this being largely due to the necessity of using the higher priced ores, which are out of reach during periods of depression in prices of iron.

It is well within the possibilities that the country at the present time is closely approaching the capacity of coke production, notwithstanding the increase in the number of by-product plants. The labor situation is always a menace during periods of prosperity. It is quite likely, therefore, that within the next year or two the production of pig iron will exceed the 30,000,000-ton rate and that it will be necessary for producers to obtain a moderate advance over present prices in order to show any profit. Even at a moderate advance, however, consumers would still be obtaining their supplies at a level of prices below the average of any five-year period in recent times.



Graphic Exhibit of Pig Iron Production, Total and Per Capita, in the United States by Decades, Beginning with 1830

figures on his chart were brought up to 1905. This chart showed a remarkable increase in consumption of pig iron per capita. This increase was most pronounced in the five-year period 1900 to 1905. The illustration herewith submitted portrays these data brought up to 1910, thus completing the last decade. It will be observed that although the increase from 1900 to 1910 is very marked, the great increase was really within the first five years of the decade. This would seem to indicate that, although the production of pig iron in tons and the corresponding consumption for the entire country and per capita are still on the increase, the same rate of increase is hardly to be expected over the present decade. This conclusion, however, may be premature, as the trade knows only too well the rather erratic rate of progress, as history has shown several instances of actual recession in production of iron, notwithstanding the steady growth of population.

In the opinion of many thoughtful men the substitution of concrete construction accounts to a large extent for the slackening rate of increase per capita in the consumption of iron, and this no doubt has had considerable influence on the situation. Should the past rate of increase in production of iron be maintained, the output in 1920 would reach, and possibly exceed, 50,000,000 tons of pig iron per year. Even with a considerable shrinkage on such an estimate, it will be seen that the present capacity for production in the United States is far below what may be required before the end of the present decade. The statistics of each decade seem to furnish record figures difficult to surpass; but these apparently high records seem insignificant as compared with the achievements of succeeding years.

It is to be hoped, however, that the contemplation of the chart will not stimulate ambitious manufacturers to continue the erection of blast furnaces in excess of the normal demand for their product. It is generally believed that should the demand be sufficient, the furnaces already completed could supply 32,000,000 tons of pig iron per annum, and still have considerable reserve capacity.

It is quite possible that the next stringency in the supply

of pig iron and consequent advance in values will be due to the scarcity of raw material rather than to inadequate furnace capacity. This may seem improbable at the moment, in view of the abundant supplies of ores both domestic and foreign. It is, however, a well-known fact that a marked increase in the production of iron over normal figures brings about increased cost; this being largely due to the necessity of using the higher priced ores, which are out of reach during periods of depression in prices of iron.

## Pacific Coast Metal Trades Officers

The officers elected by the United Metal Trades Association of the Pacific Coast for the coming year have already been given in these columns, the new president being John Hartman, manager of the Atlas Foundry & Machine Works, Tacoma, Wash. In addition to the officers the executive organization is made up of a chairman, vice-chairman and treasurer for each district. The announcement of the choice of these three district committees has just been made as follows:

Washington District.—Chairman, E. Johnson, manager Seattle Machine Works, Seattle; vice-chairman, J. V. Paterson, manager Seattle Construction & Dry Dock Company; treasurer, J. J. Hendricks, Hendricks Mfg. Company, Seattle.

Oregon District.—Chairman, A. G. Labbe, assistant manager Willamette Iron & Steel Works, Willamette; vice-chairman, H. E. Harris, manager Harris Ice Machine Works, Portland; treasurer, H. T. Clarke, manager Portland Iron Works, Portland.

Inland Empire District.—Chairman, A. R. Blewett, manager Northwest Harvester Company, Spokane; vice-chairman, Fred Ehlers, manager Pacific Iron Works, Spokane; secretary and treasurer, Stanley Nayall, manager Armstrong Machinery Company, Spokane.

The Rockwell Furnace Company, 26 Cortlandt street, New York, has recently completed for the Heppenstall Forge & Knife Company, Pittsburgh, Pa., and Bridgeport, Conn., three of its overfired type accurate temperature furnaces for the heat treatment of steel forgings, etc. The largest furnace has a heating chamber 4 ft. wide by 50 ft. long. The fuel used is oil.

\*Pilling & Crane, Philadelphia.



## Pig Iron Production

### May Output Greatest Since March, 1910

### Steel Works Furnaces Make Their Highest Record—Merchant Furnaces Also Show a Gain

Our pig iron statistics for May show that the increase promised at the beginning of that month was more than realized. With a net increase of 6 in the number of furnaces in blast, the total output of coke and anthracite iron was 2,512,582 gross tons, or 81,051 tons a day, against 2,375,436 tons in April, or 79,181 tons a day. Of the increase of 1900 tons a day, about 1600 tons was contributed by the steel works furnaces, while the merchant furnaces, after two months of declining output, showed a gain of 900 tons a day, the largest since October, 1911. The daily capacity of the 247 furnaces in blast at the beginning of this month was 81,435 tons a day, or 1738 tons more than on May 1.

#### Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, beginning with May, 1911, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons.			
	Steel works.	Merchant.	Total.
May, 1911 .....	42,270	18,809	61,079
June .....	42,708	16,877	59,585
July .....	42,472	15,369	57,841
August .....	47,120	15,030	62,150
September .....	49,696	16,207	65,903
October .....	50,351	17,460	67,811
November .....	48,430	18,218	66,648
December .....	46,885	19,027	65,912
January, 1912 .....	47,844	18,540	66,384
February .....	53,482	18,960	72,442
March .....	58,961	18,630	77,591
April .....	61,024	18,157	79,181
May .....	62,018	19,033	81,051

#### Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in May and the four months preceding:

#### Monthly Pig Iron Production—Gross Tons.

	Jan. (31 days)	Feb. (29 days)	Mar. (31 days)	Apr. (30 days)	May. (31 days)
New York .....	118,783	119,420	148,176	182,419	177,846
New Jersey .....	66,497	70,185	79,866	79,955	75,444
Lehigh Valley .....	70,323	64,817	63,787	61,323	65,252
Schuylkill Valley ..	41,334	41,169	41,780	46,102	47,336
Lower Susquehanna and Lebanon Val.	493,099	525,445	623,450	599,774	634,160
Pittsburgh district ..	117,987	118,163	121,923	117,099	119,018
Shenango Valley ..	106,708	109,552	123,234	129,223	141,385
West Penn. ....	45,716	38,393	39,215	33,744	38,005
Maryland, Virginia and Kentucky ...	121,561	117,599	124,108	110,296	117,993
Wheeling district ..	218,221	224,200	254,876	248,173	257,401
Mahoning Valley ..	140,022	159,562	192,707	184,699	183,012
Central and North Ohio .....	32,495	34,627	37,875	39,446	40,267
Hocking Valley, Hanging Rock and S. W. Ohio.	245,046	250,333	306,017	332,004	377,292
Chicago district ...	69,351	65,192	70,300	68,846	67,825
Mich., Minn., Mo., Wis., Col., Wash.	145,830	137,720	149,931	151,610	150,915
Alabama .....	22,938	24,438	28,073	20,723	19,431
Tenn., Georgia and Texas .....	2,057,911	2,100,815	2,405,318	2,375,436	2,512,582
Total .....					

#### Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last, while stated separately, are also included in the columns of "total production."

#### Production of Steel Companies—Gross Tons.

Pig. Total production—				Spiegeleisen and ferromanganese.		
	1910.	1911.	1912.	1910.	1911.	1912.
January	1,773,201	1,128,448	1,483,153	19,538	8,360	22,622
February	1,620,539	1,185,782	1,550,995	21,396	12,821	15,950
March	1,739,212	1,518,063	1,827,792	25,591	11,704	11,538
April	1,669,898	1,434,142	1,830,717	22,304	10,657	11,104
May	1,619,283	1,310,378	1,922,557	26,529	13,641	20,518
June	1,549,112	1,281,241	.....	27,680	22,611	.....
July	1,462,689	1,316,646	.....	22,924	17,067	.....
August	1,442,572	1,460,610	.....	25,756	14,579	.....
September	1,410,221	1,490,898	.....	15,151	17,757	.....
October	1,419,624	1,560,884	.....	8,500	19,697	.....
November	1,242,804	1,452,907	.....	9,032	19,678	.....
December	1,113,174	1,453,446	.....	12,178	20,698	.....

#### Capacity in Blast June 1 and May 1

The following table shows the daily capacity of furnaces in blast June 1 and May 1:

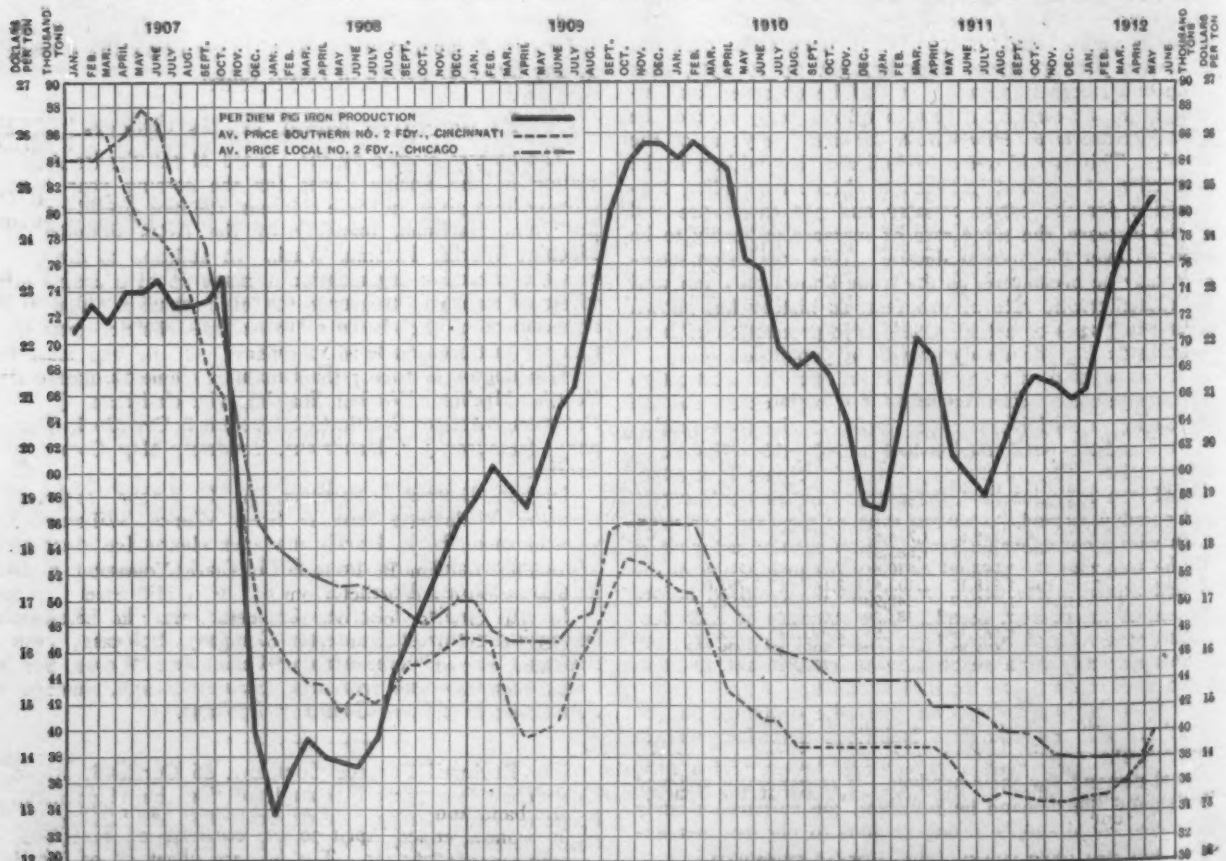


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to June 1, 1912; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace.

Location of Furnaces.	Coke and Anthracite Furnaces in Blast.			
	Total number of stacks.	June 1 Number in blast.	June 1 Capacity per day.	May 1 Number in blast.
New York:				
Buffalo	17	15	5,240	14
Other New York	7	3	571	3
New Jersey	7	0	0	0
Pennsylvania:				
Lehigh Valley	22	10	2,350	10
Spiegel	3	1	84	1
Schuylkill Valley	16	8	2,056	8
Lower Susquehanna	7	2	630	2
Lebanon Valley	10	6	910	6
Pittsburgh District	49	45	19,704	47
Spiegel	4	4	510	2
Shenango Valley	20	12	4,050	11
Western Pennsylvania	27	16	4,641	15
Maryland	4	2	565	2
Wheeling District	14	10	3,806	10
Ohio:				
Mahoning Valley	24	20	8,303	20
Central and Northern	23	16	5,974	16
Hocking Val., Hanging				
Rock & S. W. Ohio	15	8	1,210	9
Illinois and Indiana	32	29	12,150	28
Spiegel	2	1	125	0
Mich., Wis. and Minn.	10	5	1,105	5
Colorado, Mo. and Wash.	8	3	1,083	3
The South:				
Virginia	23	5	573	4
Kentucky	5	1	130	1
Alabama	46	18	4,910	18
Tennessee	20	7	755	6
Total	415	247	81,435	241

There was a net gain of 6 in the number of active furnaces last month. The list of those blown in includes one Lackawanna at Buffalo, one Warwick in the Schuylkill valley, Clinton in Allegheny county, one Shenango in the Shenango valley, Adrian in Western Pennsylvania, Pulaski in Virginia, one Toledo in Ohio, one Iroquois and one Gary in the Chicago district, one Detroit in Michigan and Johnson City in Tennessee. Among furnaces blown out last month were one Worth in the Schuylkill valley, one Duquesne in Allegheny county, one Central at Cleveland (Ohio), Globe in the Hanging Rock district, and Thomas and one Mayville in Wisconsin.

#### Chart of Pig Iron Production and Prices

The fluctuations in pig iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of *The Iron Age*. The figures for daily average production are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.						
	1907.	1908.	1909.	1910.	1911.	1912.
January	71,149	33,918	57,975	84,148	56,752	66,384
February	73,038	37,163	60,976	85,616	64,090	72,442
March	71,821	39,619	59,232	84,459	70,036	77,591
April	73,885	38,289	57,962	82,792	68,836	79,181
May	74,048	37,603	60,753	77,102	61,079	81,051
June	74,486	36,444	64,656	75,516	59,585	.....
July	72,763	39,287	67,793	69,305	57,841	.....
August	72,594	43,851	72,546	67,963	62,150	.....
September	72,783	47,300	79,507	68,476	65,903	.....
October	75,386	50,554	83,856	67,520	67,811	.....
November	60,937	51,595	84,917	63,659	66,648	.....
December	39,815	56,158	85,022	57,349	65,912	.....

#### The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.					
	1907.	1908.	1909.	1910.	1911.
Jan.	2,205,607	1,045,250	1,797,560	2,608,605	1,759,326
Feb.	2,045,068	1,077,740	1,707,340	2,397,254	1,794,509
Mar.	2,226,457	1,228,204	1,832,194	2,617,949	2,171,111
Apr.	2,216,558	1,149,602	1,738,877	2,483,763	2,064,086
May	2,295,505	1,165,688	1,883,330	2,390,180	1,893,456
June	2,284,575	1,092,131	1,930,866	2,265,478	1,787,566
July	2,255,660	1,218,129	2,103,431	2,148,442	1,793,068
Aug.	2,250,410	1,359,831	2,248,930	2,106,847	1,926,637
Sept.	2,183,487	1,418,998	2,385,206	2,056,275	1,977,102
Oct.	2,396,972	1,567,198	2,599,541	2,093,121	2,102,147
Nov.	1,828,125	1,577,854	2,547,508	1,909,780	1,999,433
Dec.	1,234,279	1,740,912	2,635,680	1,777,817	2,043,270

The salesmen and officers of the Vandyck-Churchill Company, Singer Building, Liberty street, New York, including representatives from other cities, held a meeting at the main office of the company and at the Machinery Club June 4.

The Baldt Steel Company, New Castle, Pa., has re-elected Frank Thayer president and treasurer and Charles Ferris Jamison secretary.

#### The Pittsburgh Foundrymen's Association

The annual meeting of the Pittsburgh Foundrymen's Association was held in the rooms of the Engineers' Society in the Oliver Building, Pittsburgh, on the evening of June 3. In the absence of the president, S. R. Sleeth of the Westinghouse Air Brake Company, Wilmerding, Pa., occupied the chair. The report of the treasurer for the year was read, showing a balance on hand June 1 of \$810.87. The report of the secretary showed that the association now has a membership of 157, of which five are honorary members. William Yagle, of the Yagle Foundry & Machine Company, Pittsburgh, was elected a trustee to succeed Eliot A. Kebler, who has removed to Chicago. The paper of the evening was entitled "Brass Mixtures," and was presented by William H. Wood, foreman of the brass shops of the Pennsylvania Lines West, Pittsburgh.

The election of officers to serve for the year beginning June 1 was held and resulted as follows: William A. Bole, Westinghouse Machine Company, East Pittsburgh, president; H. W. Petty, American Steel Foundries, vice-president; F. H. Zimmers, Union Foundry & Machine Company, Pittsburgh, secretary, and William J. Brant, treasurer. An Executive Committee was elected as follows: H. M. Wilson, Taylor-Wilson Mfg. Company; George W. Knotts, United Engineering & Foundry Company; John A. Logan, Jones & Laughlin Steel Company; James R. Daragh, Rogers, Brown & Co., and W. J. Phillips, Phillips & McLaren, all of Pittsburgh. The secretary of the association has secured an option on 20 rooms at the Hotel Statler, Buffalo, for the convention to be held there September 24, 25 and 26. The plan suggested is for the Pittsburgh party to leave Pittsburgh at 5 p. m. Monday evening, September 23, via the Pittsburgh & Lake Erie, arriving at Buffalo at 10:15 p. m. The option on the hotel quarters expires September 1.

#### Blast Furnace Notes

The stack of the Thomas Furnace Company, Milwaukee, was blown out May 28. It will require about 60 days for the erection of a new unloading bridge on the company's dock.

The furnace of the Globe Iron Company, Jackson, Ohio, was blown out May 31 and will be out of blast for the remainder of the year for remodeling and repairs.

The Northwestern Iron Company, Mayville, Wis., had one furnace in blast June 1. Its A furnace was blown out May 11.

Both furnaces of the Detroit Iron & Steel Company, on Zug Island, Detroit, were in operation June 1, B furnace having been blown in May 13.

The Empire Steel & Iron Company's furnace at Oxford, N. J., which has been out of blast for many months, will be blown in this week.

The Lackawanna Steel Company, Buffalo, N. Y., had six of its blast furnaces in operation at the opening of this month, the No. 6 furnace having been blown in May 12.

The Carnegie Steel Company had one less blast furnace active on June 1 than on May 1, one Duquesne stack having been blown out May 22.

The Zenith blast furnace at Duluth, Minn., was blown in June 1.

The A furnace of the American Steel & Wire Company's Central group at Cleveland was blown out in May.

The William B. Pollock Company, Youngstown, Ohio, has received a contract from the Brier Hill Steel Company of that city for one 600-ton metal mixer to be operated electrically, also a contract for eight metal cars, seven of which are of 45 tons capacity and one 60 tons, for use between the blast furnaces and mixer and between the mixer and the open-hearth steel furnaces.

The Pittsburgh Steel Company, operating an open-hearth steel plant, rod and wire mills at Monessen, Pa., and band and hoop mills at Glassport, Pa., reports for the 10 months ended April 30 net earnings of \$1,056,915, an increase of \$265,215. The balance sheet as of April 30 shows a profit and loss surplus of \$3,776,598; cash on hand, \$420,458.



# The Iron and Metal Markets

## Record Steel Works Outputs

### Coke and Labor Are Limiting Factors

#### Plans for New Steel Corporation Capacity— Remarkable Expansion in Exports— Heavy Ore Shipments

Our report of pig iron production in May emphasizes again the present record rate of steel works operations. The pig iron total last month was 2,512,582 tons, or 81,051 tons a day, against 2,375,436 tons, or 79,181 tons a day in April. The significance of the figures is in the fact that the steel company furnaces made 1,922,557 tons of pig iron last month, against their previous high record of 1,830,717 tons in April. Last month's total for steel works furnaces is thus 150,000 tons more than their high record in the well remembered movement of 1909-10, namely, 1,773,201 tons in January, 1910.

The merchant furnace output, after two months of decline, increased by 900 tons a day last month, but at 19,033 tons a day is still about one-third less than the average for the well remembered six months of expansion ending April 1, 1910. Hence with a record steel production we are still below the best record in pig iron production.

The country is now producing pig iron, including charcoal iron, at the rate of 30,000,000 tons a year, the 247 coke and anthracite furnaces active June 1 having a daily capacity of 81,435 tons, against 79,697 tons a day for 241 furnaces on May 1.

By contrast with two months ago, the industry is not now discussing predictions of recession, but rather those factors in the situation which may work against further increase in output. Coke supply is admittedly one of these. There are also reminders every week from some quarter that the scarcity of common labor is a definite check upon the effort to meet the market's demands.

Highly significant after months of complaint of over-capacity is the giving out of plans for a new rail mill at the Edgar Thomson works, fourteen 60-ton open hearth furnaces and other construction, all to cost \$8,000,000. For a slabbing mill and other new work at Gary it is stated that \$3,000,000 will be spent, and on the completion of the Duluth steel plant in the next 18 months, about \$6,000,000.

The April figures of iron and steel exports, showing a total of 258,000 tons of the products reported by weight, were a surprise, representing a yearly rate of over 3,000,000 tons, against less than 2,200,000 tons last year. Canada has contributed no small part of the increase. Her railroads are about to place further good rail orders on this side.

Reports agree that with a number of the large steel companies May shipments made a new record. There is thus more surprise that the Steel Corporation's unfilled orders should have increased by, roundly, 100,000 tons.

Railroad buying holds the place of importance. The

Chicago, Pittsburgh and Ensley rail mills booked 80,000 tons of rails last week. Bridge work is still considerable. Large buying of spikes is reported—50,000 kegs by railroads and 20,000 kegs by a Southwestern merchant interest. The Pennsylvania Railroad bought 3000 all-steel cars, and the inquiries that are considered good call for nearly 40,000 cars.

The only important change in prices is an advance of one point or about \$2 a ton in merchant steel pipe under 6 in. effective June 1.

In the Eastern markets structural contracts closed in the week ran up to 40,000 tons, including 30,000 tons in the Metropolitan district, of which the largest contract was the Biltmore Hotel, 14,000 tons. The New Haven placed 6,000 tons of light bridge material for trolley wires.

The scarcity of steel billets and sheet bars is rather more marked. Steel companies in the Pittsburgh district have gone outside for more steel so as to keep finishing mills going full.

Pig iron markets are generally quiet, but there are underlying elements of strength. In the East about 20,000 tons of basic iron has been sold by one interest, and one Eastern buyer has been sounding producers on 30,000 tons for fourth quarter. Coke is still reckoned an important factor in the pig iron market for the later months of the year.

May shipments of Lake Superior ore were 5,919,074 tons, or next to the May report made in 1910. The June movement is expected to exceed 7,000,000 tons. For the year 45,000,000 tons is now talked of, including 24,000,000 tons for the Steel Corporation.

## A Comparison of Prices

### Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

Pig Iron, Per Gross Ton:	June 5, May 29, May 8, June 7, 1912. 1912. 1912. 1911.			
	1912.	1912.	1912.	1911.
Foundry No. 2 standard, Philadelphia .....	\$15.25	\$15.25	\$15.25	\$15.00
Foundry No. 2, Valley furnace .....	13.25	13.25	13.25	13.75
Foundry No. 2, Southern, Cincinnati .....	14.25	14.25	14.00	13.75
Foundry No. 2, Birmingham, Ala. ....	11.00	11.00	10.75	10.50
Foundry No. 2, at furnace, Chicago* .....	14.50	14.50	14.50	15.00
Basic, delivered, eastern Pa. ....	15.25	15.25	15.25	14.50
Basic, Valley furnace .....	13.00	13.00	13.00	13.10
Bessemer, Pittsburgh .....	15.15	15.15	15.15	15.90
Malleable Bessemer, Chicago .....	14.50	14.50	14.50	15.00
Gray forge, Pittsburgh .....	13.90	13.90	13.75	14.15
Lake Superior charcoal, Chicago	<b>16.25</b>	15.75	15.75	17.00

Billets, etc., Per Gross Ton:			
Bessemer billets, Pittsburgh .....	21.00	21.00	20.50
Open hearth billets, Pittsburgh .....	20.50	20.50	20.00
Forging billets, Pittsburgh .....	28.00	28.00	27.00
Open hearth billets, Philadelphia .....	23.40	23.40	23.40
Wire rods, Pittsburgh .....	25.00	25.00	25.00

Old Material, Per Gross Ton:			
Iron rails, Chicago .....	16.00	16.00	16.00
Iron rails, Philadelphia .....	16.50	16.50	16.50
Car wheels, Chicago .....	<b>14.25</b>	14.00	14.00
Car wheels, Philadelphia .....	13.50	13.50	13.50
Heavy steel scrap, Pittsburgh .....	13.25	13.25	13.25
Heavy steel scrap, Chicago .....	12.00	12.00	11.75
Heavy steel scrap, Philadelphia .....	13.50	13.50	13.50

\*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel, Per Pound to Largest Buyers:	June 5, 1912.	May 29, 1912.	May 8, 1912.	June 7, 1911.
Bessemer rails, heavy, at mill.....	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.30	1.30	1.30	1.27½
Iron bars, Pittsburgh.....	1.25	1.25	1.25	1.25
Iron bars, Chicago.....	1.25	1.25	1.25	1.20
Steel bars, Pittsburgh.....	1.20	1.20	1.20	1.25
Steel bars, tidewater, New York.....	1.36	1.36	1.36	1.41
Tank plates, Pittsburgh.....	1.25	1.25	1.25	1.35
Tank plates, tidewater, New York.....	1.41	1.41	1.36	1.51
Beams, Pittsburgh.....	1.25	1.25	1.25	1.35
Beams, tidewater, New York.....	1.41	1.41	1.36	1.51
Angles, Pittsburgh.....	1.25	1.25	1.25	1.35
Angles, tidewater, New York.....	1.41	1.41	1.36	1.51
Skelp, grooved steel, Pittsburgh.....	1.15	1.15	1.15	1.30
Skelp, sheared steel, Pittsburgh.....	1.20	1.20	1.20	1.35

### Sheets, Nails and Wire,

Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh.....	1.90	1.90	1.90	2.00
Wire nails, Pittsburgh.....	1.60	1.60	1.60	1.80
Cut nails, Pittsburgh.....	1.55	1.55	1.55	1.60
Fence wire, annealed, 0 to 9, P'gh.....	1.40	1.40	1.40	1.60
Barb wire, galv., Pittsburgh.....	1.90	1.90	1.90	2.10

### Coke, Connellsville,

Per Net Ton, at Oven:	Cents.	Cents.	Cents.	Cents.
Furnace coke, prompt shipment.....	\$2.10	\$2.10	\$2.35	\$1.45
Furnace coke, future delivery.....	2.35	2.35	2.25	1.70
Foundry coke, prompt shipment.....	2.40	2.50	2.65	1.75
Foundry coke, future delivery.....	2.50	2.50	2.40	2.00

### Metals, Per Pound:

	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	17.25	16.75	15.87½	12.45
Electrolytic copper, New York.....	17.12½	16.62½	15.75	12.25
Spelter, St. Louis.....	6.75	6.75	6.65	5.25
Spelter, New York.....	6.90	6.90	6.80	5.55
Lead, St. Louis.....	4.12½	4.12½	4.05	4.22½
Lead, New York.....	4.20	4.20	4.20	4.37½
Tin, New York.....	45.75	46.00	45.87½	48.25
Antimony, Hallett, New York.....	7.85	7.62½	7.55	8.75
Tin plate, 100-lb. box, New York.....	\$3.64	\$3.64	\$3.54	\$3.94

### Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

**Plates.**—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.25c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square ft., are considered ¾ in. plates. Plates over 72 in. wide must be ordered ¾ in. thick on edge, or not less than 11 lb. per square ft. to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot, down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including all straight taper plates) 3 ft. and over in length.....	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.50
Locomotive firebox steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive.....	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive.....	.50
Cutting to lengths or diameters under 1 ft.....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

**Wire Rods and Wire.**—Bessemer, open hearth and chain rods, \$25. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, \$1.40; galvanized, \$1.70. Carload lots to retailers, annealed, \$1.50; galvanized, \$1.80. Galvanized barb wire, to jobbers, \$1.90; painted, \$1.60. Wire nails, to jobbers, \$1.60.

The following table gives the prices to retail mer-

chants on wire in less than carloads, including the extras Nos. 10 to 16, which are added to the base price:

	Fence Wire, per 100 Lb.							
Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed.....	\$1.55	\$1.60	\$1.65	\$1.70	\$1.80	\$1.90	\$2.00	\$2.10
Galvanized.....	1.85	1.90	1.95	2.00	2.10	2.20	2.60	2.70

**Structural Material.**—I-beams, 3 to 15 in.; channels, 3 to 15 in., and angles, 3 to 6 in., on one or both legs, ¼ in. and over, 1.25c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in.....	1.30 to 1.35
H-beams over 18 in.....	1.30 to 1.35
Angles over 6 in.....	1.30 to 1.35
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card Sept. 1, 1909.....	1.30 to 1.35
Tees, 3 in. and up.....	1.30 to 1.35
Zees, 3 in. and up.....	1.25 to 1.30
Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909.....	1.30 to 1.35
Deck beams and bulb angles.....	1.55 to 1.60
Hand rail tees.....	2.10 to 2.25
Checkered, trough and corrugated floor plates.....	2.25 to 2.50

### Extras for Cutting to Length.

	Cents per lb.
Under 3 ft., to 2 ft., inclusive.....	.25
Under 2 ft., to 1 ft., inclusive.....	.50
Under 1 ft.....	1.55
No charge for cutting to lengths 3 ft. and over.	

**Sheets.**—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows:

### Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8.....	1.25 to 1.30
Nos. 9 and 10.....	1.35 to 1.40
Nos. 11 and 12.....	1.40 to 1.45
Nos. 13 and 14.....	1.45 to 1.50
Nos. 15 and 16.....	1.55 to 1.60

### Box Annealed Sheets, Cold Rolled.

Nos. 10 to 12.....	1.55 to 1.60	
Nos. 13 and 14.....	1.60 to 1.65	
Nos. 15 and 16.....	1.65 to 1.70	1.75 to 1.80
Nos. 17 to 21.....	1.70 to 1.75	1.80 to 1.85
Nos. 22, 23 and 24.....	1.75 to 1.80	1.85 to 1.90
Nos. 25 and 26.....	1.80 to 1.85	1.90 to 1.95
No. 27.....	1.85 to 1.90	1.95 to 2.00
No. 28.....	1.90 to 1.95	2.00 to 2.05
No. 29.....	1.95 to 2.00	2.05 to 2.10
No. 30.....	2.05 to 2.10	2.15 to 2.20

### Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11.....	1.90 to 2.00
Nos. 12, 13 and 14.....	2.00 to 2.10
Nos. 15 and 16.....	2.10 to 2.15
Nos. 17 to 21.....	2.30 to 2.40
Nos. 22, 23 and 24.....	2.40 to 2.50
Nos. 25 and 26.....	2.60 to 2.70
No. 27.....	2.75 to 2.85
No. 28.....	2.90 to 3.00
No. 29.....	3.00 to 3.10
No. 30.....	3.20 to 3.30

All above rates on sheets are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following:

### Corrugated Roofing Sheets by Weight.

Effective April 18, 1912, the rates for painted and formed roofing sheets, per 100 lb., as announced by the American Sheet & Tin Plate Company, are based on the following extras for painting and forming over prices for corresponding gauges in black and galvanized sheets:

	Gauges, per 100 lb.			
	29	25 to 28	19 to 24	12 to 18
<b>Painting.</b>				
Regular or oiling.....	0.15	0.10	0.05	
Graphite, regular.....	0.25	0.15	0.10	
<b>Forming.</b>				
2, 2½, 3 and 5 in. corrugated.....	0.05	0.05	0.05	0.05
2 V-crimped, without sticks.....	0.05	0.05	0.05	
¾ to 1¼ in. corrugated.....	0.10	0.10	0.10	
3 V-crimped, without sticks.....	0.10	0.10	0.10	
Pressed standing seam, with cleats.....	0.15	0.15		
Plain roll roofing, with or without cleats.....	0.15	0.15	0.15	
Plain brick siding.....	0.20	0.20		
3/16 in. crimped.....	0.20	0.20	0.20	
Weatherboard siding.....	0.25	0.25		
Beaded ceiling.....	0.25	0.25		
Rock face brick and stone siding.....	0.25			
Roll and cap roofing, with caps and cleats.....	0.25	0.25		
Roofing valley, 12 in. and wider.....	0.25	0.25		
Ridge roll and flashing (plain or corrugated).....	0.65	0.65	0.65	

Corrugated Roofing Sheets, with 2½-In. Corrugations, per Square.

Some leading manufacturers of roofing material are

MECHANICAL AND CIVIL ENGINEERS,  
PITTSBURGH, PA.



still quoting on an area basis and are naming prices as follows:

Gauge.	Painted.	Galvanized.	Gauge.	Painted.	Galvanized.
29.....	.....	\$2.40	23.....	\$2.30	\$3.50
28.....	\$1.35	2.55	22.....	2.50	3.80
27.....	1.50	2.60	21.....	2.70	4.05
26.....	1.60	2.65	20.....	2.90	4.35
25.....	1.80	3.05	19.....	2.90	5.70
24.....	2.00	3.15	16.....	4.70	6.50

**Wrought Pipe.**—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe, in effect from June 1, 1912; black iron pipe from December 1, 1911; galvanized iron pipe from March 1, 1912:

*Butt Weld.*

	Steel		Iron	
	Black.	Galv.	Black.	Galv.
1/4 and 1/2 in.....	73	53	68	49
3/4 in.....	74	64	69	53
1 in.....	77	67	72	59
3/4 to 1 1/2 in.....	80	72	75	64
2 to 3 in.....	81	74	76	65

*Lap Weld.*

1/4 and 1/2 in.....	..	..	68	61
2 in.....	78	71	72	63
2 1/2 to 4 in.....	80	73	74	66
4 1/2 to 6 in.....	79	71	73	65
7 to 12 in.....	78	68	71	61
13 to 15 in.....	55	..	47	..

*Butt Weld, extra strong, plain ends, card weight.*

1/4, 1/2, 3/4 in.....	70	60	65	55
1 in.....	75	69	70	63
3/4 to 1 1/2 in.....	79	73	74	65
2 to 3 in.....	80	74	75	66

*Lap Weld, extra strong, plain ends, card weight.*

1 1/2 in.....	..	..	66	60
2 in.....	76	70	71	63
2 1/2 to 4 in.....	78	72	73	66
4 1/2 to 6 in.....	77	71	72	65
7 to 8 in.....	70	60	65	55
9 to 12 in.....	65	55	60	50

*Butt Weld, double extra strong, plain ends, card weight.*

1/4 in.....	65	59	60	52
3/4 to 1 1/2 in.....	68	62	63	55
2 to 3 in.....	70	64	65	57

*Lap Weld, double extra strong, plain ends, card weight.*

2 in.....	66	60	61	52
2 1/2 to 4 in.....	68	62	63	57
4 1/2 to 6 in.....	67	61	62	56
7 to 8 in.....	60	50	55	45

*Plugged and Reamed.*

1 to 1 1/2, 2 to 3 in. Butt Weld	Will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld as specified.
2, 2 1/2 to 4 in..... Lap Weld	

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

**Boiler Tubes.**—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

1 3/4 to 2 1/4 in.....	64	Standard Charcoal Iron.	
2 1/2 in.....	66 1/2	1 1/2 in.....	48
2 3/4 to 3 1/4 in.....	71 1/2	1 3/4 to 2 1/4 in.....	50
3 1/2 to 4 in.....	74	2 1/2 in.....	55
5 to 6 in.....	66 1/2	2 3/4 to 3 1/4 in.....	57 1/2
7 to 13 in.....	64	3 1/2 to 5 in.....	60

Locomotive and steamship special grades bring higher prices.

2 1/2 in. and smaller, over 18 ft., 10 per cent. net extra.  
2 1/4 in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f. o. b. mill at Pittsburgh basing discount, lowered by two points.

## Pittsburgh

PITTSBURGH, PA., June 5, 1912.

The announcement by the Carnegie Steel Company that it will spend about \$8,000,000 in building a new rail mill and 14 60-ton open-hearth furnaces at its Edgar Thomson works and an advance of one point, or \$2 a ton, on merchant pipe up to 6 in. are the two important events of a rather quiet week. The local feeling in the steel trade continues optimistic. The pig iron market is quiet, with no large inquiries out. Steel billets continue scarce and in some cases slight premiums have been paid over regular prices for prompt deliveries. The situation all through the finished lines is strong. The mills are adhering rigidly to regular prices on new inquiries, but the amount of material sold on the basis of 1.20c. for steel bars, 1.25c. for plates and shapes and \$3.50 for tin plate has been relatively small, as consumers are well covered for some time ahead. Shipments by the mills this month are likely to make

some new records, as buyers will rush in specifications and take out all they can against contracts which expire on June 30, knowing that any unspecified tonnage will then be promptly cancelled by the mills. A better buying movement is looked for in July, as a good many consumers will have to cover requirements again and in addition there will be a pretty clear idea as to how the crops may turn out. Some in the trade still predict there will be another upward turn in prices if a heavy buying movement occurs in July or August, and this is not improbable. The scrap trade is tightening up in prices and on some grades dealers are asking from 50c. to \$1 a ton advance over figures quoted two or three weeks ago. The coke trade is fairly active, with most dealers holding firmly at \$2.35 to \$2.40 on furnace coke contracts for last half. Several large lots have been sold at this price. The scarcity of labor in the coke regions is still restricting the output to a considerable extent.

**Pig Iron.**—The market continues quiet. No large inquiries are out at present. W. P. Snyder & Co. announce that the average price in May for Bessemer iron, based on sales of 1000 tons or over, was \$14.2345, compared with \$14.25 in April, and on basic iron \$13, compared with \$12.767 in April. There were a number of small sales of Bessemer iron made in May at \$14.10 and \$14.15 at Valley furnace, but these are not included in the compilations thus made. In spite of the fact that pig iron makers are confronting high prices for their coke for the last half of the year, and the continued reductions in stocks which are lighter now than for many months, prices do not strengthen. The Pittsburgh Steel Company is reported to be figuring on the purchase of 12,000 tons of basic for July delivery and one interest is said to have quoted \$13 at Valley furnace. A sale of 6000 tons of basic for third quarter delivery is reported at \$13 at Valley furnace. Sales of 5000 to 6000 tons of gray forge iron for last half delivery are reported at about \$12.90, Valley furnace, a slight decline over the price quoted for some time. We quote standard Bessemer iron at \$14.25 to \$14.50; basic, \$13 to \$13.25; malleable Bessemer, \$13 to \$13.25; No. 2 foundry, prompt delivery, \$13.25, and for last half, \$13.50; gray forge, \$13, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

**Steel.**—Two leading local mills are reported to have bought additional tonnages of billets and sheet bars from outside makers on account of inability to get deliveries fast enough from their regular sources of supply. A local interest reports a sale of about 1500 tons of 4 x 4 in. open-hearth billets, ordinary carbons, for third quarter delivery at a trifle under \$21, Pittsburgh. The local steel mills are out of the market as sellers and the two Youngstown interests are also well sold up, and any mills that can ship billets or sheet bars out within two or three weeks are able to get relatively high prices. The billet and rail sales department of the Carnegie Steel Company reports that its actual orders for billets and rails and track supplies sent to the mills in May for rolling showed a slight increase over April. We quote open hearth billets, \$20.50 to \$21; Bessemer billets, \$21 to \$21.50; Bessemer and open-hearth sheet bars, \$21.50 to \$22; axle billets, \$25; forging billets, for general forging purposes, \$28, all f.o.b. Pittsburgh and Youngstown.

**Ferroalloys.**—Local consumers of ferromanganese who have material due them on contracts report that they are having a good deal of trouble in getting deliveries, and the scarcity of this material for prompt shipment seems to be getting worse instead of better. Where dealers are able to guarantee prompt deliveries, they are able to get from \$53 to \$55 in carload lots, while in some cases a few tons have been sold at even higher figures. One interest is reported to have contracted for 1500 tons of 80 per cent. for first half of 1913 delivery at the full price of \$48.50, Baltimore, but this sale has not been officially confirmed. We quote 80 per cent. ferromanganese at \$48.50, Baltimore, for future delivery, and from \$52 to \$55 in carload lots for prompt shipment. Prices on ferrosilicon are strong, and there is talk of an early advance in prices. We note sales of four or five carloads of 50 per cent. ferrosilicon, amounting to about 150 tons, for prompt delivery at the full price of \$70, delivered. We quote 50 per cent. ferrosilicon in lots up to 100 tons at \$70; over 100 tons to 600 tons, \$69, and over 600 tons, \$68, Pittsburgh. The lower grades are ruling at about \$20 for 10 per cent.; \$21 for 11 per cent.; \$22 for 12 per cent., f.o.b. cars at furnace, Ashland, Ky., or Jackson, Ohio. On ferrotitanium we quote 8c. per lb. for carload lots; 10c. per lb. in 2000-lb. lots and over, and 12 1/2c. per lb. in lots up to 2000 lb.

**Wire Rods.**—Some inquiries are in the market for fairly large lots of Bessemer and open-hearth rods for last half delivery from consumers whose contracts expire June 30. The current demand is only for small lots and is very light. One leading maker is still reported to be holding rods at \$26 minimum, but several other mills are naming \$25 for last half delivery. We quote Bessemer open-hearth and chain rods at \$25 to \$26 f.o.b. Pittsburgh.

**Skelp.**—The new demand for both iron and steel skelp continues quite heavy, and prices are strong. One maker reports sales of about 2000 tons of grooved steel skelp at 1.17½c. delivered at buyer's mill in the Pittsburgh district. We quote grooved steel skelp at 1.15c. to 1.17½c.; sheared steel skelp, 1.20c. to 1.22½c.; grooved iron skelp, 1.55c. to 1.60c.; sheared iron skelp, 1.65c. to 1.70c., delivered at buyer's mill, Pittsburgh district.

**Steel Rails.**—The Carnegie Steel Company has taken a contract from the Western Maryland Railroad for 2165 tons of 90 lb. rails for early delivery and has also taken several smaller orders for standard sections. The new demand for light rails is more active, the Carnegie Company having received new orders and specifications in the past week for about 2800 tons. The three rail mills at Edgar Thomson are now being operated to about 75 per cent. of capacity and have a good deal of business ahead of them. We quote splice bars at 1.50c. per lb. and rails as follows: Standard sections, 1.25c. per lb.; 8 and 10-lb. light rails, 1.29½c.; 12 and 14-lb., 1.20c.; 16 and 20-lb., 1.15c.; 25, 30, 35, 40 and 45-lb., 1.10c., in carload lots, f.o.b. Pittsburgh.

**Structural Material.**—New orders have been fairly active, and fabricating interests report that inquiries are more numerous. The McClintic-Marshall Construction Company has taken 1200 tons for extensions to buildings for the Alan Wood Iron & Steel Company, Conshohocken, Pa., the Cambria Steel Company, 1200 tons for the Vendig Hotel, Philadelphia, and the American Bridge Company 1800 tons for a large store building in the East, 1000 tons for bridge work for the Ontario & Western Railroad, 5400 tons for a viaduct for a Western railroad, 770 tons for bridge work for the Chicago Great Western, and 1485 tons for new buildings for the Minnesota Steel Company. Local fabricators have more work on their books than for some time and state that prices are slowly improving. The market is strong. We quote beams and channels up to 15 in. at 1.25c., Pittsburgh.

**Plates.**—The Pennsylvania Railroad slipped into the market quietly last week and bought 3000 all-steel cars, of which 1000 went to the Pressed Steel Car Company, 1000 to the Standard Steel Car Company, 500 to the American Car & Foundry Company and 500 to the Cambria Steel Company. The Norfolk & Western will build 500 all-steel cars at its shops at Norfolk, Va., and the plates and shapes, about 5000 tons, will be furnished by the Carnegie Steel Company. Unofficial reports are that the Pennsylvania Lines West will buy 10,000 to 12,000 cars; the Baltimore & Ohio, 13,000; the Boston & Maine about 5000, the New York Central about 3000 and the Kansas City Southern 2000. The two local steel car companies report they have not as yet received these inquiries, but it is stated positively that several of the leading railroads are making up estimates for a large number of steel cars and a good deal of new buying is looked for this month. The general demand for plates is light, but leading plate mills are loaded to the guards with business, and are from four to eight weeks back in shipments. The market is firm. We quote ¼ in. and heavier plates at 1.25c., Pittsburgh.

**Iron and Steel Bars.**—There is a fair amount of new buying in both iron and steel bars, but most consumers are covered for a considerable time ahead, and are out of the market. Several local concerns report a very heavy demand for hard steel bars for concrete reinforcing purposes and the tonnage moving from the mills is large. Shipments of steel bars in May by the leading makers are reported to have been the greatest in any one month in the history of the trade, and it is expected will be fully as heavy this month, as some contracts expire June 30 and consumers will rush in specifications as fast as possible to take advantage of the lower prices at which these contracts were placed. The mills rolling iron bars are busier now than for many months and their shipments are also larger than for a long time. The market is firm and we continue to quote steel bars on new orders at 1.20c. and common iron bars at 1.25c.

**Tin Plate.**—This is the off season in the tin plate trade and not much will be done until August or September. Specifications against contracts for tin plate placed earlier in the year are being received by the

mills in enormous volume, and shipments by the makers in May are reported to have broken all previous records. They would probably have been larger but for the scarcity of tin bars. The greater part of the output of the mills up to October 1 is under contract and in some recent cases contracts have been made with leading consumers for delivery in fourth quarter. The American Sheet & Tin Plate is operating to about 95 per cent. of its hot tin mill capacity, and other leading makers are running full, so that the output at present is the heaviest ever known in the history of the trade. The market is firm. We quote at \$3.40 to \$3.50 per base box for 14 x 20 coke plates.

**Sheets.**—Shipments by the leading mills in May are reported to have been the greatest in any one month in the history of the trade and are expected to be fully as large or perhaps heavier this month. Some contracts for sheets expire on June 30 and consumers are certain to specify very freely against these contracts for fear of cancellation of unshipped portions. The mills are still having trouble in getting sheet bars promptly and one or two leading interests are reported to have made further purchases of sheet bars from outside mills. The leading mills are operating to full capacity and prices are very firm. No. 28 black sheets are held at 1.90c. to 1.95c., and galvanized sheets from 2.90c. to 3c., Pittsburgh, the lower prices being absolutely minimum.

**Cotton Ties.**—The cotton tie season was opened by the mills May 27 and the price has been fixed at 72c. per bundle, f.o.b. Pittsburgh. The cotton season this year is about three weeks late. The manufacture of cotton ties is largely controlled by the Carnegie Steel Company, Pittsburgh Steel Company, Sharon Steel Hoop Company and Atlanta Steel Company, Atlanta, Ga.

**Hoops and Bands.**—The new demand is only fair and usually for small lots, but most consumers are covered by contracts for some time ahead against which they are specifying freely. Some contracts for hoops and bands that will expire June 30 are reported to have been renewed for the last half at regular prices. We quote steel bands on new orders at 1.25c., with extras as per the steel bar card, and steel hoops at 1.25c. to 1.30c., the lower price being stated to be absolutely minimum of the market.

**Bolts and Rivets.**—Makers state that the new demand is quite active, and consumers are specifying heavily against contracts placed some time ago when prices were slightly lower. The demand for structural rivets is referred to as being particularly large. We quote structural rivets at \$1.50 to \$1.55 per 100 lb. base in carload lots and boiler rivets at \$1.60 to \$1.65 per 100 lb. base in carload lots, f.o.b. Pittsburgh. Makers of bolts claim that on all new orders full prices are being quoted and are not being shaded. We quote: Small carriage bolts, cut thread, 80 and 7½ per cent. off; small carriage bolts, rolled threads, 80 and 15 off; large carriage bolts, 75 and 10 off; small machine bolts, rolled threads, 80 and 20 off; small machine nuts, cut threads, 80 and 12½ off; large machine bolts, 75 and 15 off; square hot-pressed nuts, blank or tapped, \$6.30 off, and hexagon nuts, \$7.10 off. These prices are in lots of 300 lb. or over delivered within a 20c. freight radius of maker's works.

**Shafting.**—The new demand is only fair and specifications against contracts have not been satisfactory to the makers for some time. Efforts of makers of shafting to get an advance in prices have not been successful. We quote cold-rolled shafting at 67 per cent. off in carloads and larger lots, and 62 per cent. in less than carload lots, delivered in base territory.

**Spelter.**—The market has been quite firm, the new demand being reported more active. The consumption of spelter is said to be heavier than ever before in the history of the trade. We quote prime grades of Western at 6.70c., East St. Louis, or 6.84½c., Pittsburgh.

**Railroad Spikes.**—Eastern and Western railroads are specifying freely against contracts placed some time ago. The New York Central, Baltimore & Ohio, Erie and other prominent roads are said to have specified recently for upward of 50,000 kegs for early delivery. The market is firm. We quote base sizes at \$1.45 per 100 lb., f.o.b. Pittsburgh.

**Wire Products.**—The local demand for wire and wire nails is only for small lots. The season is evidently pretty well over until about August, when it is expected that fall trade will open up. Some of the leading wire nail mills will cancel contracts June 30 that have not all been specified for, most of these having been made on the \$1.50 basis. There still remain some contracts to be filled taken on the \$1.55 basis, and the amount of new business in wire nails placed on the \$1.60 basis and in



annealed wire on the \$1.40 basis has been relatively small. It is said that the leading wire and wire nail mills are not operating at present to more than 75 per cent. of capacity and the orders on their books for future delivery are rather light. We quote wire nails at \$1.60; cut nails, \$1.50; galvanized barb wire, \$1.90; painted, \$1.60; annealed fence wire, \$1.40, and galvanized fence wire, \$1.70, f.o.b. Pittsburgh, usual terms, freight added to point of delivery.

**Merchant Pipe.**—Effective June 1, the leading makers of merchant pipe sent out notices to the trade of an advance of one point, or \$2 a ton, on sizes up to 6 in. This advance is stated to have been made on account of the higher prices for billets and skelp which have added materially to the cost of making pipe. The only large active inquiry for line pipe at present is that of the Ohio Fuel Supply Company for about 60 miles of 12-in. Several of the leading mills report that actual orders for tubular goods sent to the mills for rolling in the first five months of this year show an increase over the same period last year of 30 to 40 per cent. Shipments in May were very heavy and considerably larger than in April. The tone of the market is stronger than for some time.

**Boiler Tubes.**—Nearly all consumers of boiler tubes are covered up to July 1 and in some cases into third quarter, so that the amount of new business placed since the advance of \$2 a ton was made in prices has been relatively small.

**Iron and Steel Scrap.**—While reports are that heavy steel scrap and other grades, such as borings and turnings, are very scarce and have advanced in price, yet dealers claim that when they attempt to get higher figures from consumers they are not able to do so. It is also true that dealers claim it is easier to sell scrap at present to other dealers than it is to consumers and get full prices. There is no doubt, however, that the tone of the market is stronger, particularly as regards heavy steel scrap, borings, turnings and low phosphorus steel scrap. The available supply is limited and dealers are afraid to sell short lest they will not be able to cover at a profit. We note sales of 1000 tons of heavy steel scrap at \$13.25; 500 tons at \$13.50; 200 tons at \$13.50; 1000 tons of turnings at \$10.75 and 500 tons at \$11; 400 tons of No. 1 busheling scrap at \$12.65; 200 tons of No. 2 at \$8.75 and 1000 tons of low phosphorus melting stock at \$15.75, all for delivery at consumers' mills in the Pittsburgh and nearby districts. We quote as follows, per gross ton:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery .....	\$13.25 to \$13.50
No. 1 foundry cast .....	12.75 to 13.00
No. 2 foundry cast .....	11.50 to 11.75
Bundled sheet scrap f.o.b. consumers' mill, Pittsburgh district .....	11.75 to 12.00
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md. and Franklin, Pa. ....	13.75 to 14.00
No. 1 railroad malleable stock .....	12.50 to 12.75
Grate bars .....	9.75 to 10.00
Low phosphorus melting stock .....	15.75 to 16.00
Iron car axles .....	22.50 to 22.75
Steel car axles .....	15.75 to 16.00
Locomotive axles .....	22.00 to 22.50
No. 1 busheling scrap .....	12.50 to 12.75
No. 2 busheling scrap .....	8.50 to 8.75
Old car wheels .....	14.00 to 14.25
*Cast iron borings .....	10.00 to 10.25
*Machine shop turnings .....	10.50 to 10.75
†Sheet bar crop ends .....	14.75 to 15.00
Old iron rails .....	15.50 to 15.75
No. 1 wrought scrap .....	13.75 to 14.00
Heavy steel axle turnings .....	11.00 to 11.25
Stove plate .....	10.25 to 10.50

\*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

**Coke.**—There is something of a deadlock on at present between coke makers and furnace operators, the latter contending that they cannot afford to pay \$2.40 or \$2.50 for their furnace coke for last half and continue to sell their pig iron at present prices. The coke market is very firm, but just at present a peculiar condition exists, as a number of furnaces have shut off shipments, and this is adding to the available supply of coke for prompt shipment. This is believed to be only a temporary condition and will not last long. We note sales of prompt furnace coke as follows: 4000 tons at \$2.20; 1000 tons at \$2.25; 11,000 tons at \$2.20, and 10,000 tons at \$2.15, all per net ton at oven. Contracts are also reported for 7500 tons of furnace coke per month for last half at \$2.50 and 11,000 tons per month for same delivery and at the same price. The labor situation in the coke regions is not any better. We quote standard makes of furnace coke for prompt shipment at \$2.10 to \$2.15 per net ton at oven, and at \$2.35 to \$2.50 for shipment over last half. A number of large

inquiries for furnace coke for last half of the year are in the market, particularly from Eastern furnace operators. There is a fair demand for foundry coke, and best makes of 72-hour are held at \$2.40 to \$2.65 per net ton at oven, and from \$2.50 up to \$2.75 for last half delivery. The output in the Upper and Lower Connells-ville regions last week was 405,000 tons, an increase of about 5000 tons over the previous week.

## Chicago

CHICAGO, ILL., June 3, 1912.

Specifications for finished steel products in May were generally heavier than for any of the preceding months in the year, and for some of the local mills new production records were established. Consumers having contracts through the first half are sending in specifications for as large a portion of their balances as possible, and to this fact the heavy current specifications are largely due. While for some of the mills there is a slight easing up on structural specifications shipments in other lines are not making noticeable headway toward the betterment of delivery. The pig iron market is quiet but firm and the position of the various grades of scrap in the old material market is unchanged.

**Pig Iron.**—The market continues quiet with inquiry light. One inquiry for 1500 tons of malleable is noted. Although there is little business available in this territory the furnace position as regards price is firm. Southern furnaces generally are asking \$11.50 for No. 2 foundry for last half shipment, and lower quotations than this are infrequent except for small lots of spot shipment iron on which \$11 has been made in some instances. Lake furnaces continue to ask \$14.50 at the furnace and we have revised our price for high silicon irons in keeping with an advance of 50c. per ton. Sales of 1500 tons of 9 per cent. silicon iron are reported at prices slightly below our quotation. The price of ferromanganese continues at a high level and a carload sale at \$67 per ton is noted. There is apparently little spot shipment material available and the outlook is for a still more acute shortage. An active demand for coke has prevailed. Minimum prices for charcoal iron are slightly higher. We quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

Lake Superior charcoal .....	\$16.25 to \$16.75
Northern coke foundry, No. 1 .....	15.00
Northern coke foundry, No. 2 .....	14.50
Northern coke foundry, No. 3 .....	14.25
Northern Scotch, No. 1 .....	16.00
Southern coke, No. 1 foundry and No. 1 soft .....	15.85 to 16.35
Southern coke, No. 2 foundry and No. 2 soft .....	15.35 to 15.85
Southern coke, No. 3 .....	15.10 to 15.60
Southern coke, No. 4 .....	14.60 to 15.10
Southern gray forge .....	14.10 to 14.60
Southern mottled .....	13.85
Malleable Bessemer .....	14.50
Standard Bessemer .....	16.75
Basic .....	14.75
Jackson County and Kentucky silvery, 6 per cent. ....	17.40
Jackson County and Kentucky silvery, 8 per cent. ....	18.40
Jackson County and Kentucky silvery, 10 per cent. ....	19.40

**Rails and Track Supplies.**—The rail transactions of the past week were confined for the most part to specifications against contracts, but it is understood that an important tonnage is pending. Very liberal specifications for track fastenings are being received and the aggregate railroad business, both in specifications and new orders, is exceeding expectations by a considerable margin. We quote standard railroad spikes at 1.55c. to 1.65c., base; track bolts with square nuts, 1.95c., base, all in carload lots, Chicago; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.20c. to 1.25c.; 16 to 20 lb., 1.25c. to 1.30c.; 12 lb., 1.30c. to 1.35c.; 8 lb., 1.35c. to 1.40c.; angle bars, 1.50c., Chicago.

**Structural Material.**—Contracts for fabricated material show a total of nearly 5,000 tons, of which the most important were 1945 tons for the Society Brand building, Chicago, awarded to the South Halsted Street Iron Works, and 1200 tons for the Bippie-Polk building, Des Moines, Iowa, awarded to Noelke-Richards Iron Works. Other contracts include 168 tons for the Empress Theatre, St. Louis, to the American Bridge Company; 224 tons for a school building, Salt Lake City, to the Minneapolis Steel & Machinery Company; 135 tons for a viaduct at Van Buren, Ark., to the Illinois Bridge Company; 531 tons for the Republic building, Kansas City, to the Kansas City Structural Steel Company; 371 tons for a city hall at Spokane, Washington, and 220 tons for the Flume, Culvert & Machinery Company, Minneapolis. While there has been a slackening in structural orders a number of mills are still practi-

cally out of the market. With the exception of an order for 400 Hart steel convertible cars placed by the Frisco System no important new car business developed. There has been some miscellaneous buying by Western roads of both cars and locomotives, and there remains to be placed a number of important contracts previously reported. We quote without change, for Chicago delivery, mill shipment on plain shapes, 1.43c., and from store, 1.70c.

**Plates.**—Interest centers in the effort of the mills to improve deliveries and satisfy customers. Comparatively little progress is being made in this direction, owing to the steady continuance of heavy specification. We quote, for Chicago delivery, mill shipment, 1.43c., and from store, 1.70c.

**Bars.**—All the prominent mills are now firmly on the basis of 1.20c., Pittsburgh, minimum, and with the exception of mills to which Bessemer bar business would be acceptable little is being promised in the way of delivery prior to September. This condition and the advancing price for steel is responsible in a measure for a considerable overflow to iron bars, and the local rolling mills have all of this business they can handle. Bar iron prices are firmly on the basis of 1.25c., Chicago. We quote as follows: Bar iron, 1.25c.; hard steel bars, 1.20c. to 1.25c.; soft steel bars, 1.38c., and from store, soft steel bars, 1.60c., Chicago.

**Sheets.**—Market conditions offer little that is new. Prices are generally more uniform. We quote, Chicago delivery, as follows: Carload lots, from mill, No. 28 black sheets, 2.08c. to 2.13c.; No. 28 galvanized, 3.13c. to 3.18c.; No. 10 blue annealed, 1.58c. to 1.63c. Prices from store are: No. 10, 1.95c.; No. 12, 2c.; No. 28 black, 2.30c., and No. 28 galvanized, 3.45c.

**Rivets and Bolts.**—We note an advance in the price of hot pressed nuts, both square and hexagon and accordingly the manufacturers' schedule of discounts for carriage bolts has been revised and we quote, effective May 21, as follows: Carriage bolts up to  $\frac{3}{8}$  in. x 6 in., rolled thread, 80 and 15; cut thread, 80 and  $7\frac{1}{2}$ ; larger sizes, 75 and  $7\frac{1}{2}$ ; machine bolts up to  $\frac{3}{8}$  in. x 4 in., rolled thread, 80 and 20; cut thread, 80 and  $12\frac{1}{2}$ , larger sizes, 75 and  $12\frac{1}{2}$ ; coach screws, 80 and 20; hot pressed nuts, square head, \$6.30 off per cwt.; hexagon, \$7.10 off per cwt. Structural rivets,  $\frac{1}{2}$  in. and larger, 1.68c. base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

**Old Material.**—A general scarcity of common labor has arisen in many mill centers severe enough to affect production materially, and in this territory the handling of incoming scrap has been especially handicapped. Consumptive demand continues at the recent rate and the volume of incoming material is also large, particularly in busheling and cut forge grades. In addition to the country scrap offered the Lake Shore & Michigan Southern has a list, the Baltimore & Ohio is offering close to 10,000 tons and the Soo Line 2,000 tons. The general run of prices is unchanged as compared with a week ago, though moderate size sales of wrought scrap are reported at prices slightly less, while No. 1 busheling and old car wheel sales show slight gains in value. We quote for delivery at buyers works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	\$16.00 to \$16.50
Old steel rails, rerolling	13.25 to 13.75
Old steel rails, less than 3 ft.	12.50 to 13.00
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	14.25 to 14.75
Heavy melting steel scrap	12.00 to 12.50
Frogs, switches and guards, cut apart	12.00 to 12.50
Shoveling steel	12.00 to 12.50
Steel axle turnings	9.50 to 10.00

Per Net Ton.	
Iron angles and splice bars	\$13.75 to \$14.25
Iron arch bars and trauoms	15.25 to 15.75
Steel angle bars	11.75 to 12.25
Iron car axles	19.25 to 19.75
Steel car axles	15.75 to 16.25
No. 1 railroad wrought	12.50 to 13.00
No. 2 railroad wrought	11.50 to 12.00
Steel knuckles and couplers	11.25 to 11.75
Steel springs	11.75 to 12.25
Locomotive tires, smooth	12.50 to 13.00
Machine shop turnings	7.50 to 8.00
Cast and mixed borings	6.75 to 7.25
No. 1 busheling	10.50 to 11.00
No. 2 busheling	7.75 to 8.00
No. 1 boilers, cut to sheets and rings	8.50 to 9.00
Boiler punchings	13.00 to 13.50
No. 1 cast scrap	11.75 to 12.25
Stove plate and light cast scrap	10.25 to 10.75
Railroad malleable	11.75 to 12.25
Agricultural malleable	10.75 to 11.25
Pipes and flues	9.25 to 9.75

**Wire Products.**—For the needs of the building trade and of manufacturers preparing for fall business the

demand for wire products continues in good volume. For agricultural farm purposes a gradual decline is noted in accordance with the natural expectation at this season of the year. We quote as follows: Plain wire, No. 9 and coarser, base, \$1.58; wire nails, \$1.78; painted barb wire, \$1.78 to \$1.83; galvanized, \$2.08; polished staples, \$1.83; galvanized, \$2.13, all Chicago.

**Cast Iron Pipe.**—The placing of orders for a considerable tonnage of cast iron pipe appears to be imminent, but the only award of importance during the past week was for 200 tons at Hammond, Ind., placed with the Lynchburg Foundry Company. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$27; 6 to 12 in., \$25; 16 in. and up, \$24.50, with \$1 extra for gas pipe.

## Philadelphia

PHILADELPHIA, PA., June 4, 1912.

The volume of actual business closed in iron and steel products continues fair, while specifications are heavier. Mill operations would increase but for the continued scarcity of labor. Pig iron producers are maintaining prices with comparative firmness, but still refuse to quote for extended shipment, owing to the unsettled condition of the coke market. Considerable new business is pending in plates and structural material. Further inquiries covering four boats, in addition to those recently reported, are noted by the trade. A good demand is reported for steel billets, with some contracting for rolling steel, prices for which are very firm. Fabricated structural material prices are still low, owing to existing contracts for low price plain shapes. The demand for iron bars is scarcely as active, and some makers do not hold out so strongly for the higher price levels. Old material remains quiet, but prices are comparatively firm.

**Iron Ore.**—Rumors of sales of foreign ore to Eastern consumers are heard, but are believed to refer to purchases previously reported. The general market is quiet. Importations during the week include 9491 tons of Swedish and 6300 tons of Cuban ore.

**Pig Iron.**—Negotiations are still pending against the recent large inquiries for third quarter foundry iron. The Norfolk & Western Railroad has made purchases against its 4500 ton inquiry, while the Pennsylvania Railroad will, it is stated, make purchases against its requirements during the current week. Several large inquiries for low grade iron from the cast iron pipe makers are still unclosed, while further inquiry has developed. The general market is strong and the majority of producers are pretty well sold up and report consumers to be urging deliveries. Current sales of the higher grades of foundry iron have been mainly in small lots for reasonably early shipment at prices ranging from \$15.25 to \$15.50, delivered, for standard No. 2 X foundry, with occasional sales at \$15.75 for third quarter shipment. Odd lots are sometimes heard of at a trifle under \$15.25, but usually such transactions are confined to irons not considered standard. A somewhat better movement in Virginia foundry iron has developed. Sales of No. 2 X in moderate lots for delivery in the next three months have been made at \$13, at furnace, while one covering 100 tons a month for the next six months at \$13.25 is noted. Moderate sales of coke malleable foundry iron are announced at \$15.67, delivered here. A definite inquiry for 5000 tons from a Virginia pipe foundry is pending, while other melters have taken on moderate lots, and in one instance a consumer is in the market for a considerable block. Small sales of low grade Virginia iron to pipe works in that district are noted. Low grade iron is scarce and prices are very firm. While no sales of rolling mill torge are reported, an inquiry for several thousand tons is before the trade. No important sales of steel making grades of pig iron have been reported. One Eastern melter is sounding the market for upward of 30,000 tons of basic for fourth quarter, but sellers are not inclined to consider business so far ahead. A sale of 2000 tons as well as small sales of standard low phosphorus iron have been made at the market. Makers of this grade are now pretty well sold ahead, having little iron to offer for delivery before September. A sale of 500 tons of misfit low phosphorus at the usual 50c. reduction from the price of standard analysis iron is reported. Stocks on furnace yards in this district continue to decline, current consumption evidently being in excess of the general make. Plans are under way, however, for the blowing in of several furnaces in this district. Oxford furnace will be put in operation on basic iron this week. Everett furnace is to go out for repairs, but will be replaced by the blowing in of the Saxton stack. Plans are also under way for the



blowing in of a furnace by the Central Iron & Steel Company. Worth Brothers Company's No. 1 furnace is out and will either be repaired or the new No. 2 stack blown in. Reports that the old Meily stack of the Lebanon Valley Furnace Company would be blown in at an early date cannot be substantiated, although negotiations for its purchase are reported as still pending. Quotations are unchanged, the following range of prices being named for standard brands, delivered in buyers' yards in this district for either prompt or third quarter shipment:

Eastern Pennsylvania No. 2 X foundry....	\$15.25 to \$15.50
Eastern Pennsylvania No. 2 plain.....	15.00
Virginia No. 2 X foundry.....	15.80 to 16.00
Virginia No. 2 plain.....	15.55 to 15.75
Gray forge.....	14.50 to 14.75
Basic.....	15.25
Standard low phosphorus.....	19.75 to 20.00

**Ferroalloys.**—Considerable business in 80 per cent. ferromanganese for Western shipment during the last half and into next year at \$48.50, Baltimore, is reported. Little, however, has developed in this district. The shortage of supplies against contracts has been somewhat relieved by heavier arrivals from abroad, and prompt ferromanganese has not been in as active demand. Little business is reported moving in ferrosilicon.

**Billets.**—Further forward sales of basic open hearth rolling billets in lots of 3000 and 4000 tons, for third quarter shipment on the basis of \$23.40, delivered, have been made by one Eastern producer. A very satisfactory small lot demand is also reported. Forging billets continue in fair demand, although the business recently has been confined principally to small and moderate quantities for early shipment. Mills in this district are operating at capacity and frequently find it difficult to meet demands for urgent shipment. Prices are firm, \$23.40 to \$24.40 being quoted for basic open hearth rolling billets, while a \$28.40 basis is named for ordinary forging billets, delivered in buyers' yards in this vicinity.

**Plates.**—A very encouraging demand for heavy plates continues to come out, and while the 1.40c. minimum, delivered here, applies for a general quotation sizable offers are reported to have been booked at a shade under that figure. This is particularly reported on a transaction involving 2000 tons of plates for oil car tanks for early delivery. Miscellaneous orders and specifications against contracts continue heavy and mills are operating at a high rate but are still handicapped by a shortage in labor. Inquiries for ship plates have been quite active. In addition to recently reported vessels plate makers are figuring against three new inquiries, one covering two boats and two calling for single vessels, plate requirements against which aggregate upward of 6000 tons.

**Structural Material.**—A better volume of miscellaneous business is coming to the mills, and several larger propositions are also developing. Doak & Co. have the contract for the new hotel at Thirteenth and Chestnut streets, and the steel contract, involving some 4000 tons, will, it is believed, go to the leading interest. Bids go in to-day against the new Chesapeake & Ohio pier at Newport News, and several other good projects in the South are developing. Mills have been somewhat better engaged, and on miscellaneous business the minimum of 1.40c., delivered in this district, is firmly maintained. Fabricated material prices are, however, but slightly higher, owing to low price contracts in force for plain shapes.

**Sheets.**—Eastern mills are operating at full capacity and receive a good volume of day to day orders, largely for early shipment, which in the aggregate represent a very fair total. Specifications against contracts are reported in good volume. Prices are firm, Western No. 28 gauge sheets being quoted at 2.05c. to 2.10c., delivered here, while Eastern mills making smooth, loose rolled sheets easily obtain from ¼c. to ½c. per lb. advance over that basis.

**Bars.**—A somewhat lighter demand is noted and some producers being more anxious for business are not holding at the higher range of prices as firmly as was done several weeks ago. Ordinary iron bars, while openly quoted at 1.32½c. to 1.37½c., can be more generally purchased at 1.30c., delivered in buyers' yards in this district. A moderate business in steel bars is moving at 1.35c., delivered, while specifications against low price contracts come out freely.

**Coke.**—The market is irregular. Producers in instances hold furnace coke for second half at \$2.40 to \$2.50, at oven, while prompt coke is available at \$2.10 to \$2.25, according to brand. Under the circumstances consumers continue to buy prompt coke rather than

enter contracts at the higher level. Foundry coke has been quiet at \$2.35 to \$2.50, at oven. The following range of prices, per net ton, about represents the market for deliveries in this district:

Connellsville furnace coke.....	\$4.25 to \$4.60
Connellsville foundry coke.....	4.65 to 4.85
Mountain furnace coke.....	3.85 to 4.20
Mountain foundry coke.....	4.25 to 4.45

**Old Material.**—The market is inclined toward dullness, but prices are pretty well maintained. Few sizable transactions in any grade are reported, both buyers and sellers awaiting developments. Old material offerings by the railroads represent about the usual average. The Pennsylvania list includes some 15,000 tons of old rails, on which an upset price of \$15 a ton is understood to be held, and some 5000 tons of heavy melting steel scrap. The principal transactions during the week have been between dealers, covering materials under contract, on which deliveries are being made. The following range about represents the market for prompt deliveries in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate varying from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel scrap and crops.....	\$13.50 to \$14.00
Old steel rails, rerolling (nominal).....	14.75 to 15.25
Low phosphorus heavy melting steel scrap.....	16.25 to 16.75
Old steel axles.....	17.00 to 17.50
Old iron axles (nominal).....	23.00 to 23.50
Old iron rails (nominal).....	16.50 to 17.00
Old car wheels.....	14.00 to 14.50
No. 1 railroad wrought.....	15.75 to 16.25
Wrought iron pipe.....	12.50 to 13.00
No. 1 forge fire.....	12.00 to 12.50
No. 2 light iron (nominal).....	7.00 to 7.50
Wrought turnings.....	10.00 to 10.50
Cast borings.....	9.50 to 10.00
Machinery cast.....	13.75 to 14.25
Railroad malleable (nominal).....	12.00 to 12.50
Grate bars, railroad.....	10.50 to 11.00
Stove plate.....	10.50 to 11.00

## Cincinnati

CINCINNATI, OHIO, June 5, 1912.—(By Telegraph.)

**Pig Iron.**—The market here is just marking time. While the inquiry is very light and sales are correspondingly so, the price situation is unchanged. The recognized minimum figure on Southern No. 2 foundry is \$11, Birmingham, but few producers continue booking business for the entire year at this price. Northern foundry iron does not show up so well and the regular quotation of \$13.25, Iron-ton, for prompt shipment has been shaded to \$13 in a number of instances, but only on tonnages. A limited number of Hanging Rock furnaces are adhering to \$13.50, Iron-ton, for any shipment this year. A Michigan melter purchased last week 1000 tons of Lake Superior charcoal for last half shipment and a like tonnage of mixed Northern and Southern iron was taken by a northern Ohio consumer. Indiana foundries have lately placed quite a number of orders for small lots of foundry iron. Malleable is slow and unchanged at \$13.25, Iron-ton. From northern Ohio is an inquiry for 1000 tons of Northern No. 2 foundry for last half movement, and a Central Western melter is in the market for 2000 to 3000 tons of Southern foundry. There is no demand in sight for basic in this territory, as users have covered for several months ahead. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Iron-ton we quote, f.o.b. Cincinnati, as follows, for prompt shipment:

Southern coke, No. 1 foundry and 1 soft.....	\$14.75 to \$15.00
Southern coke, No. 2 foundry and 2 soft.....	14.25 to 14.50
Southern coke, No. 3 foundry.....	14.00
Southern coke, No. 4 foundry.....	13.75
Southern gray forge.....	13.75
Ohio silvery, 8 per cent. silicon.....	17.20 to 17.70
Lake Superior coke No. 1.....	14.70
Lake Superior coke No. 2.....	14.45
Lake Superior coke No. 3.....	14.20
Basic, Northern.....	14.45
Standard Southern car wheel.....	25.25 to 25.50
Lake Superior charcoal.....	16.75 to 17.25

(By Mail)

**Coke.**—There is a disposition on the part of producers in the Connellsville field to mark up prices. Operators in other districts are also inclined to hold out for higher figures, especially on furnace coke. In the Connellsville field \$2.25 per net ton at oven for spot shipment is said to be minimum on the leading brands, while the average contract figure is \$2.50. Foundry coke ranges from \$2.50 to \$2.75, with a few interests asking \$2.90 for future business. In the Pocahontas district 48-hr. brands are quoted around \$2 for prompt shipment, to \$2.25 per net ton, at oven, on contract orders. Wise County furnace coke is quoted at \$2 for prompt movement, with nearly all contracts based on a

sliding scale basis, depending on the price of pig iron. In the last two fields mentioned foundry grades are quoted all the way from \$2.35 to \$2.60. Blast furnace operators are very slow in contracting for future requirements, but there is considerable scattered foundry business reported.

**Finished Material.**—Structural material, including especially reinforcing concrete bars, is in excellent demand. Contrary to expectations of mill agencies the improvement in the building trade line has not yet developed into any better call for wire nails. It was thought that open weather would bring out an excellent business in this particular commodity, but it seems that dealers have a large stock on hand yet to be worked off. Structural material is quoted firm at 1.25c., Pittsburgh basis, and 1.20c. is minimum for steel bars and small shapes. Local warehouse quotations on structural material are from 1.70c. to 1.75c., with steel bars available around 1.65c. to 1.70c.

**Old Material.**—Business continues quiet, and from several sources it is reported that prices have softened somewhat. Railroad offerings in this part of the country are light. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations the selling prices f.o.b. at yards:

*Per Gross Ton.*

Bundled sheet scrap .....	\$9.00 to \$9.50
Old iron rails .....	13.00 to 13.50
Relaying rails, 50 lb. and up.....	20.25 to 21.25
Rerolling steel rails .....	11.25 to 11.75
Melting steel rails .....	10.25 to 10.75
Heavy melting steel scrap.....	10.25 to 10.75
Old car wheels .....	12.25 to 13.00

*Per Net Ton.*

No. 1 railroad wrought .....	\$10.75 to \$11.25
Cast borings .....	6.50 to 7.00
Steel turnings .....	6.50 to 7.00
No. 1 cast scrap .....	11.00 to 11.50
Burnt scrap .....	7.75 to 8.25
Old iron axes .....	16.25 to 16.75
Locomotive tires (smooth inside).....	12.00 to 12.50
Pipes and flues .....	7.25 to 7.75
Malleable scrap .....	8.75 to 9.25
Railroad tank and sheet scrap.....	6.75 to 7.25

## Birmingham

BIRMINGHAM, ALA., June 3, 1912.

**Pig Iron.**—A leading interest still declares that the iron market is an \$11 one and that it has iron to sell for the rest of the year at that figure. If fourth quarter only is desired it would probably ask a higher price. The other companies maintain the attitude mentioned heretofore. The Republic Iron & Steel Company is understood to have no iron under \$11.50, with sparse offerings for the third quarter and lacking the lower grades. The Sloss-Sheffield Steel & Iron Company reports selling its make in May and quotes \$11.25 for third quarter and \$11.50 for fourth quarter. This company's accumulations of 120,000 tons in October and November last were reduced 18,000 tons in April and 12,000 tons in May, and now stand at about 40,000 tons. Another leading interest declares that it has not had over two days' furnace output on its yards in some time. The majority of sales made during the week are reported as from carload lots to 500 tons. One interest adhering to \$11.50 says it sold 1700 tons in such lots for varying deliveries at that figure and reports breaking all shipping records in May. Steel mills report orders sufficient to keep them in operation for some time. The rail mill at Ensley is well supplied with orders, with additional ones coming in with some regularity. The rolled steel situation is of the same character. A few inquiries and one or two small sales of charcoal iron, two furnaces only producing, constitute the week's doings in that branch. Minimum prices, f.o.b. Birmingham, with 25 to 50c. advance asked by several companies, are as follows:

No. 1 foundry and No. 1 soft.....	\$11.50
No. 2 foundry and No. 2 soft.....	11.00
No. 3 foundry .....	10.50
No. 4 foundry .....	10.00
Gray forge .....	9.75
Basic .....	10.50
Charcoal iron .....	\$22.00 to 22.50

**Cast Iron Pipe.**—Makers report heavy shipments in May, and regard the gradual cleaning up of the yards as a natural forerunner of higher prices. The demand continues good, with numbers of small orders coming in. The tendency to advance prices has not been entirely realized, but it is developing strength. Quotations are continued as follows, f.o.b. cars Birmingham: 4 to 6-in., \$23; 8 to 12-in., \$22.50; over 12-in., average, \$21.50.

**Old Material.**—Dealers report steady inquiries from

the East, but inability to overcome freight rates. There have been heavy sales of cast scrap and steel in response to the strength of the iron market, mostly in the Birmingham district. Prices in this class are tending to rise. Prices quoted by dealers are as follows, per gross ton, f.o.b. Birmingham:

Wrought iron car axes.....	\$16.00 to \$17.00
Old steel axes .....	14.50 to 15.50
Old iron rails .....	14.50
No. 1 railroad wrought .....	12.00 to 12.50
No. 2 railroad wrought.....	11.00
No. 1 country wrought .....	9.50 to 10.00
No. 2 country wrought .....	9.00 to 9.50
No. 1 machinery .....	8.50 to 9.00
No. 1 steel .....	9.50 to 10.00
Tram car wheels .....	10.00 to 10.50
Standard car wheels .....	11.50 to 12.00
Light cast and stove plate .....	8.00 to 8.50

**Coal and Coke.**—The steam coal demand is up to the average for this time of the year. The demand for bunker and steam coal at Mobile, Pensacola and New Orleans is on the increase owing to activity of Alabama dealers. The prospect for renewed activities a month hence carries with it promise of large output. Coke is quiet, with Alabama foundry selling at \$3.25 to \$3.75 per net ton at oven and very little Virginia coming in. It is expected that eventually by-product coke, which is increasing in quantity, will reduce Alabama coke prices.

## Boston

BOSTON, MASS., June 4, 1912.

**Old Material.**—The market is listless. Prices have not changed, but sales at existing schedules are small. A feeling exists that in the dull months of June and July prices may be reduced. The quotations given below are of prices offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points, taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel .....	\$10.25 to \$10.75
Low phosphorus steel .....	11.45 to 11.95
Old steel axes .....	14.00 to 14.50
Old iron axes .....	17.00 to 18.00
Mixed shafting .....	13.00 to 13.50
No. 1 wrought and soft steel.....	10.00 to 10.50
Skeleton (bundled) .....	8.25 to 8.75
Wrought iron pipe .....	9.25 to 9.75
Cotton ties .....	7.75 to 8.25
No. 2 light .....	4.50 to 5.00
Wrought turnings .....	7.25 to 7.75
Cast borings .....	6.25 to 6.75
Machinery, cast .....	12.50 to 13.00
Malleable .....	8.75 to 9.25
Grate bars .....	6.00 to 6.50
Stove plate .....	8.00 to 8.50
Cast iron car wheels .....	11.75 to 12.00

## St. Louis

ST. LOUIS, MO., June 3, 1912.

The market is rather quiet so far as new business goes, but in general the movement forward on contracts is satisfactory. In some respects deliveries are becoming more extended and finished material is thereby stronger in price. Orders generally show that material is being consumed as rapidly as sent forward and in this the representatives see signs of greater activity as the first half comes to its close.

**Pig Iron.**—Orders for the most part have been in carload lots and to a large extent from the small consumer. The largest inquiry in the market is for 1000 tons of malleable. No. 2 Southern remains firm at \$11 to \$11.25, Birmingham, for third quarter and \$11.50 for last quarter, but Northern iron shows a slightly softening tendency without, however, any quotable change from the figures last given. Competition on a large inquiry would very likely bring out concessions in prices.

**Coke.**—The only business doing in coke is on contracts. Shipments keep well up, an evidence of continued consumption which representatives believe will develop inquiries toward the end of the month. There have been no quotable concessions in prices, but there is nevertheless a softening tendency. By-product coke is quiet at \$5.45, delivered, though even this might be shaded.

**Finished Iron and Steel.**—The Frisco purchase of standard steel rails has not been definitely closed except for 10,000 tons for the Chicago & Eastern Illinois, already announced. A Southwestern road is considering a 20,000-ton contract and the Kansas City, Mexico & Orient receivers are also contemplating a large tonnage. The ends of fiscal years, it is firmly believed, will bring



out further inquiries. Fastenings have been active and strong, with deliveries extended. In structural material the orders on contracts and otherwise have kept a good aggregate moving, but no large new business is in the market at present. The small new orders come invariably with a request for quick shipment. Plates are strong and hard to get. Deliveries are such that the American Car & Foundry Company's plant at St. Charles, Mo., has been compelled to close temporarily, but as soon as supplies come in it is to run night and day to catch up on contracts. Bars are stronger, but prices have not been advanced. Light rails show very little doing because of the season of the year.

**Old Material.**—The scrap market continues strong here in spite of the fact that a large amount of material is about to come on the market. Lists out to close during the week include 3000 tons from the Missouri Pacific, 900 tons from the Frisco, 700 tons from the Mobile & Ohio and 500 tons from the Kansas City Southern. There is a good demand for relaying rails and rolling mills are buying. Steel plants are more active in the search for bargains. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton.	
Old iron rails	\$14.00 to \$14.50
Old steel rails, rerolling	12.00 to 12.50
Old steel rails, less than 3 ft.	12.00 to 12.50
Relaying rails, standard section, subject to inspection	22.00 to 22.50
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	12.00 to 12.50
Frogs, switches and guards cut apart	12.00 to 12.50
Per Net Ton.	
Iron fish plates	\$13.00 to \$13.50
Iron car axles	18.00 to 18.50
Steel car axles	16.00 to 16.50
No. 1 railroad wrought	12.50 to 13.00
No. 2 railroad wrought	11.75 to 12.25
Railway springs	10.50 to 11.00
Locomotive tires, smooth	12.50 to 13.00
No. 1 dealers' forge	8.50 to 9.00
Mixed borings	6.75 to 7.25
No. 1 busheling	9.50 to 10.00
No. 1 boilers, cut to sheets and rings	8.00 to 8.50
No. 1 cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.50 to 9.00
Railroad malleable	10.00 to 10.50
Agricultural malleable	8.50 to 9.00
Pipes and flues	8.00 to 8.50
Railroad sheet and tank scrap	8.00 to 8.50
Railroad grate bars	9.00 to 9.50
Machine shop turnings	7.50 to 8.00

## San Francisco

SAN FRANCISCO, CAL., May 28, 1912.

Local merchants maintain a rather conservative attitude, notwithstanding the greater firmness of the Eastern market and a generally satisfactory volume of distributive business on the coast. While some firms report a slight decrease in sales as compared with April most merchants have already specified to the extent of their second quarter contracts in several departments and are compelled to make additional purchases to cover their June requirements. The immediate prospect of further price advances has attracted considerable attention to the market, but jobbers are inclined to buy with caution and keep their stocks within reasonable limits, and few if any mill representatives are ready as yet to accept contracts for third quarter delivery. Few large individual orders are being booked in any line and structural work is rather slow.

**Bars.**—Both soft steel and deformed reinforcing bars are moving well, the latter being especially active. Several large inquiries have come out within the last few weeks, and the two local mills are getting a large part of the business. Prices are well maintained. The outlook for new business in reinforcing bars is good. The demand for soft steel from small consumers is somewhat better than last year and many new orders are coming from jobbers and manufacturers. Jobbing prices are steady as before, bars from store, San Francisco, being quoted at 2.25c. for steel and 2.15c. for iron.

**Structural Material.**—Several large buildings are under consideration, some having already been figured, but actual contracts are still limited to work of a small or medium class. Jobs requiring 100 tons or less are fairly numerous. Among the more important lettings of late were the Sierra Investment Company's building, to the Balston Iron Works, at \$29,321, and a job of about the same size for J. D. Phelan, to the Schrader Iron Works. Among the largest buildings now being figured are the St. Joseph's Church, 350 tons, and the Burnett apartment house, about 250 tons. The State armory steel plans are not yet out, though the excavation contract has been let. The Union Iron Works is having plans drawn for a steel frame power house. Plans are

under way for the Insurance Exchange building on California street, 15 stories, and the St. Francis Hotel annex is expected in the market before long. Plans are expected by June 1 for the United States Sub-Treasury building. Bids will be opened June 1 for the Geary street car barn, but reinforced concrete will probably be used.

**Rails.**—The recent tonnage both of light and standard sections has been comparatively small, though a good demand is noted for extremely light rails, portable track, etc., for agricultural and mining use. Inquiries from the lumber trade are below expectations, though several new logging projects are talked of. Interurban railroads are buying little at the moment, but two or three large orders from such sources are expected in the next two or three months.

**Sheets.**—The riveted pipe trade continues active, and heavy contracting on the part of manufacturers is expected when the books are opened for third quarter business. Distributive trade in black and galvanized sheets continues very active and jobbers are buying freely, finding their stocks well cleaned up. They are very conservative, however, in figuring their third quarter requirements, being anxious not to overload.

**Plates.**—The distributive movement is very light and little new business is coming out on large tank jobs, though some good inquiries are expected. The Standard Oil Company is increasing the capacity of its Richmond, Cal., refinery to some extent. The Interisland Navigation Company, Honolulu, recently placed an order for 1000 tons for a floating drydock and there is some buying by shipbuilding firms along the coast.

**Merchant Pipe.**—The small country trade continues active, and the local demand is very fair. Merchants are specifying freely, but are not inclined to buy heavily for extended delivery, not being convinced that any advance in prices could be maintained under present conditions. The oil well trade is steady, but not especially active. Occasional good sized orders are expected in connection with pipe lines now under construction, and some waterworks business is noted. The town of Lincoln, Cal., has let a contract to the Sacramento Pipe Company for 5625 ft. of 11-in. screw casing. Bids will be received June 8 for a fuel oil distributing system in the San Francisco Presidio, and on June 12 for an 8-mile water pipe line at Fort Huachuca, Ariz. Considerable business in boiler tubes has been brought out by the recent advance.

**Cast Iron Pipe.**—A few contracts calling for a fair tonnage have been placed, but most of the business is in small orders. Los Angeles is now taking figures on 1740 tons, and the town of Modesto, Cal., will open bids this week on 835 tons. The San Diego Gas & Electric Company has bought about 150 tons for extensions, and small orders have been placed by San Luis Obispo and San Bernardino, Cal. The Pacific Gas & Electric Company has ordered 350 tons for extensions in several towns.

**Pig Iron.**—Orders for foundry work are still small and scattering, and little if any increase is noted in the consuming demand. While there is some buying in small lots melters still have considerable iron from former purchases and do not feel warranted in making much provision for the future. The movement of foreign iron is too small to establish definite values. No. 2 Southern foundry iron is quoted at \$21.

**Old Material.**—The greatest activity, as for some time past, is in steel melting scrap and old rails. Practically all the Geary street railway scrap has been resold by the original purchaser, and several large piles of melting scrap have been disposed of, a sale of 10,000 tons for shipment by sea having been closed this week. There is still a fair tonnage of this material on hand, however. Cast iron scrap is moving in a small way only. Prices remain steady, as follows: Cast iron scrap, per net ton, \$14; steel melting scrap, per gross ton, \$11.50 to \$12; wrought scrap, per net ton, \$12.50 to \$15; rerolling rails, per net ton, \$11.

The Pacific Hardware & Steel Company, San Francisco, which some time ago took an interest in the Pacific Coast Steel Company in exchange for its Portland rolling mill property, etc., has sold out that interest to the other stockholders of the Pacific Coast Steel Company.

Several structural steel fabricators of San Francisco are co-operating with brick manufacturers in the Brick Builders' Bureau to promote the use of steel frame brick construction. Former State Engineer Nat Ellery is manager of the bureau.

## Cleveland

CLEVELAND, OHIO, June 4, 1912.

**Iron Ore.**—Shipments from the upper lake docks during May were 5,919,074 tons. This is the second largest movement for the month of May. In May, 1910, shipments reached 6,081,358 tons. The movement up to June 1 this year was 6,123,116 tons or 1,478,549 tons less than during the same period of 1910, which was a record season. A number of the shippers got a slow start and the shipments were not heavy the first half of the month. Shipments at present are heavy and it is believed that the June movement will exceed 7,000,000 tons and perhaps break the former record of 7,316,592 tons, made in June, 1910. As far as sales are concerned the market has settled down to a state of inactivity. We quote prices as follows: Old Range Bessemer, \$3.75; Mesaba Bessemer, \$3.50; Old Range non-Bessemer, \$3.05, and Mesaba non-Bessemer, \$2.85.

**Pig Iron.**—Demand for foundry grades has improved somewhat and is fairly active. Many consumers not previously covered for last half requirements are now buying for that delivery. We note the sale of two 1000-ton lots and several lots ranging from 300 to 500 tons. A northern Ohio farm engine builder is in the market for 1000 tons of analysis iron for the last half and several inquiries for 500 tons and under are pending. Prices on foundry grades are very firm. The minimum quotation on No. 2 foundry is \$13.25; Cleveland and Valley furnaces, and one or two Valley interests are asking \$13.50. The recent advance in price to \$13.50, delivered, Cleveland, for No. 2 is being maintained. Sales for shipments from Toledo are being made at \$13.50 to \$13.75. Regular price quotations on Ohio silvery iron are not being maintained in this market. One seller during the week sold considerable tonnage in this territory at \$15.50 at furnace for 8 per cent. silicon. There is practically no inquiry for Southern iron. We quote prices as follows for prompt shipment and for the last half, delivered Cleveland:

Bessemer .....	\$15.15
Basic .....	13.50
Northern No. 2 foundry .....	13.50
Southern No. 2 foundry .....	15.35
Gray forge .....	12.75 to 13.00
Jackson silvery, 8 per cent. silicon .....	17.05 to 17.55

**Coke.**—As few consumers have purchased their foundry coke for last half, an active buying movement is expected to set in within the next week or two. A few small contracts have been closed at \$2.75 but that price represents the top of the market. We quote standard Connellsville 72-hr foundry coke at \$2.50 to \$2.75 per net ton at oven, for prompt shipment and contract. Prices on furnace grades for spot shipment are easier. We quote Connellsville furnace coke at \$2.15 to \$2.25 for prompt shipment.

**Finished Iron and Steel.**—Specifications are heavy and show no falling off in volume. New business continues light. Manufacturing plants are generally busy and the consumption of material is large. Some of the mills are getting further behind on deliveries. Many consumers who have become accustomed to be able to secure shipments promptly during the past year or two find that they have delayed too long in getting specifications to the mills and are not getting material as needed. In a few cases consumers overbought on the rising market and have failed to specify the full monthly allotment of their tonnage and that not specified has been promptly cancelled. This tonnage in the aggregate, however, is light. Plates have become somewhat scarce owing to the congested condition of the Pittsburgh mills and some small lot sales for prompt shipment are being made at premium prices. The market is very firm on steel bars, plates and structural material. The demand for billets continues quite active. A local mill reports the sale of several lots of open-hearth billets of considerable weight in the aggregate for Western shipment at \$22, Cleveland. The Carnegie Steel Company has taken 2000 tons of plates and shapes for the Toledo Shipbuilding Company for a car ferry. Lake shipbuilders are figuring on a number of boats for the lake and Atlantic coast trade, there being inquiries out for boats for about all class of service except bulk freighters. The only new structural inquiry of any size is for 500 tons for the East End Model Market Company, Cleveland. The demand for sheets is good, but prices are somewhat irregular. Black sheets are quoted at 1.90c, Pittsburgh, and galvanized at 2.90c for No. 28, but these prices are being shaded. Rivets are firmer and the quoted prices of 1.55c, Pittsburgh, for structural and 1.65c, for boiler rivets are being more generally maintained. The demand for wire is active and some last half contracts are being placed. Bar iron is very firm at 1.25c, Cleveland,

and the demand is good. There are reports that this price is being shaded \$1 a ton in the Buffalo district.

**Old Material.**—Demand is quite active and the market is very firm, although price quotations remain about the same as a week ago. Little, if any, heavy melting steel is offered under \$12.75. Cleveland dealers have sold considerable heavy steel scrap and turnings in the Youngstown and Pittsburgh districts. Local iron mills have also been active buyers of scrap. Dealers are buying quite heavily for stock, believing that there will be a further advance in prices. A large amount of railroad scrap is offered this week. Bids were received Tuesday on lists from the Lake Shore, Erie and Pennsylvania Railroads, and the Big Four will close on a list Thursday. Dealers' prices, f.o.b. Cleveland, are as follows:

Per Gross Ton.	
Old steel rails, rerolling .....	\$12.75 to \$13.00
Old iron rails .....	14.00 to 14.50
Steel car axles .....	17.50 to 18.00
Heavy melting steel .....	12.50 to 12.75
Old car wheels .....	13.00 to 13.50
Relaying rails, 50 lb. and over .....	22.50 to 23.50
Agricultural malleable .....	10.50 to 11.00
Railroad malleable .....	12.00 to 12.50
Light bundled sheet scrap .....	9.50 to 10.00

Per Net Ton.	
Iron car axles .....	\$18.50 to \$19.00
Cast borings .....	7.25 to 7.50
Iron and steel turnings and drillings .....	7.50 to 7.75
Steel axle turnings .....	8.50 to 8.75
No. 1 busheling .....	10.75 to 11.00
No. 1 railroad wrought .....	12.00 to 12.25
No. 1 cast .....	11.25 to 11.75
Stove plate .....	9.00 to 9.50
Bundled tin scrap .....	11.00 to 11.50

## Buffalo

BUFFALO, N. Y., June 4, 1912.

**Pig Iron.**—Inquiry has been lighter than for the previous week. The market as a whole is therefore quieter, but it is strong and the advancing tendency in prices is continuing. Sales of all grades for the week amounted to about 15,000 tons. The total sales for the month of May from this district foot up to a considerably less tonnage than for April, but this had been expected, as the larger consumers had covered for the bulk of their last half requirements in April. We quote as follows for current quarter and last half delivery, f.o.b. Buffalo:

No. 1 X .....	\$14.00 to \$14.50
No. 2 X .....	13.75 to 14.25
No. 2 plain .....	13.50 to 14.00
No. 3 foundry .....	13.50 to 13.75
Gray forge .....	13.25 to 13.50
Malleable .....	14.25 to 14.50
Basic .....	14.25 to 14.50
Charcoal according to brand and analysis ..	15.75 to 17.00

**Finished Iron and Steel.**—Steel companies are notifying their contract customers that any tonnage not specified on contracts expiring on a given date will be canceled. This brought into the market a considerable tonnage due on contracts expiring June 1, and will no doubt bring out an increase on contracts expiring June 30, this being the date when the heaviest tonnage becomes due. It is also understood that some mills are insisting on customers specifying against their contracts in equal monthly quantities and have notified them that the unspecified portion of the monthly quota would be canceled at the expiration of each month. It has heretofore been intimated this step would be taken, but the rule is now actually being enforced. Mill deliveries are still falling behind although specifications for the week have subsided to normal from the high pressure demand of the past few weeks. Prices are very firm. Business in structural lines continues in good volume. Bids are soon to be taken for steel for a new theatre building for the Mark-Brock Amusement Company and for a factory extension for the Crosby Company, Buffalo, each requiring a good tonnage. Figures will soon be received also for a seven-story mercantile and loft building to be erected by the Main Street Realty Company, Buffalo, from plans of Colson & Hudson, architects, which will take 600 tons. Bids went in yesterday for the state highway bridge at Salamanca, requiring 500 tons. F. T. Nesbit & Co., New York City, have been awarded general contract for the Glens Falls Insurance Company's building at Glens Falls, taking 700 tons. The American Bridge Company has received contract for the steel for the new factory buildings of the Thatcher Mfg. Company, Elmira, N. Y.; for 1900 tons of steel bridges for the New York, Ontario & Western Railroad; and contracts for steel for a number of bridges in Buffalo involving good tonnages, including the Strauss bascule bridge to be built by the Buffalo Creek Railroad, 1400 tons; the Brown type bascule bridge to carry the Hamburg turnpike over the city ship



canal and the tracks of the Buffalo Creek Railroad, 500 tons, and the Ferry street bridge over the United States ship canal, for which the Great Lakes Dock & Dredge Company holds the general contract, 500 tons. The King Bridge Company has received contract for the Nickel Plate Railroad bridge over Buffalo River, 1400 tons.

**Old Material.**—The market has shown some improvement in demand, local consumption being better, although transactions are as a rule in small tonnages. The demand from outside districts is also more active, particularly for heavy melting steel. Prices are firm but unchanged. We quote as follows, per gross ton f. o. b. Buffalo:

Heavy melting steel.....	\$12.75 to \$13.25
Low phosphorus steel.....	15.75 to 16.00
No. 1 railroad wrought.....	14.00 to 14.75
No. 1 railroad and machinery cast scrap.....	13.50 to 14.00
Old steel axles.....	16.50 to 17.25
Old iron axles.....	21.00 to 21.50
Old car wheels.....	12.50 to 13.00
Railroad malleable.....	11.50 to 12.25
Boiler plate, sheared.....	13.75 to 14.25
Locomotive grate bars.....	11.00 to 11.25
Wrought pipe.....	9.50 to 10.00
Tank iron.....	10.00 to 10.25
Wrought iron and soft steel turnings.....	8.00 to 8.50
Clean cast borings.....	7.00 to 7.50

## British Pig Iron Stocks Decline

Easier Prices Due to a Molders' Lockout

(By Cable)

MIDDLESBROUGH, England, June 5, 1912.

Pig iron is dull and easier, chiefly because the molders in the Falkirk district are all locked out. Conna's stocks of No. 3 Cleveland iron are 336,602 tons and of standard iron 5070 tons, against 338,587 and 5788 tons one week ago. The reduction has been about 170,000 tons since the beginning of the coal strike three months ago.

There is a very fair inquiry for American semi-finished steel, the Germans still having nothing to offer. Prices are quite firm. There is a better demand from Calcutta for galvanized sheets. A small lot of American tin plates which arrived for London consumption has attracted considerable attention, but it was only bought owing to fears of an indefinite suspension of deliveries through the coal strike. We quote as follows:

Cleveland pig iron warrants (closing Tuesday), 53s. 6d., against 54s. 1d. one week previous.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 54s., or 6d. less than last week.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 17s. 6d.

German 2-in. billets, f.o.b. Antwerp, 100s.

German basic steel bars, f.o.b. Antwerp, £5 17s. to £5 18s.

Steel bars, export, f.o.b. Clyde, £7 12s. 6d.

Steel joists, 15-in. export, f.o.b. Hull or Grimsby, £6 17s. 6d.

Steel ship plates, Scotch, delivered local yard, £7 17s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 5s.

Steel rails, export, f.o.b. works port, £6 7s. 6d. to £6 10s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 14s. 7½d., October-December.

(By Mail)

MIDDLESBROUGH, May 25, 1912.

## Demand Still Exceeds Supply

The outstanding feature in iron and steel is that demand still overtops supply, and specifications are given out with more freedom than makers care for, anything approaching prompt delivery being out of the question. Prices still have an upward tendency, and there is generally more disposition among buyers to regard the situation as firmly established upon a permanently higher plane of values. Producers have all along maintained that selling prices were likely to go considerably higher and their fears are now proving contagious. The trouble today is not so much that the advanced prices are in any way checking business, but that consumers cannot obtain material for which they have specified. Pig iron is still going out of stores in a broad stream and prices are hard, with market gossip anticipating much higher figures. Ferromanganese is

strong at the recent advance to \$48.50 Baltimore. The Baltimore strike is keeping back vessels here, for owners do not care to send tonnage forward in the present uncertain labor position there. Speculation in warrant iron has developed more activity and now and again the shorts have been rather scared when big quantities have been cleared from the public warehouses, but general outside interest in the market continues still to run upon narrow lines, although since prices are getting fairly high there is always a chance that the attention of outsiders may be attracted.

## Supply of Foreign Semi-Finished Steel Limited

The situation in semi-finished steel goes from strength to strength. It is now recognized that a shortage of rolling down material may occur, to the extreme discomfort of thin sheet and tinplate makers. Home steel plants are quite unable to fill the demands which have poured in upon them, and within the last few weeks the situation as regards foreign material has sustained a distinct tightening. The Belgians, who have been keen sellers of sheet bars, have withdrawn entirely and are asking fancy prices for billets, while the German Steelworks Union has withdrawn all offers for delivery this year. The Verband has indeed made heavy sales during the last few months to British consumers at extensively advanced prices, but latterly the exigencies of the German home trade have become such that it is regarded as advisable to run no risk of allowing domestic works to be inconvenienced while foreign consumers were being supplied; hence the decision to close the books for export trade. The American position is much firmer than it was—viewed from this side of the Atlantic at all events. The Steel Corporation has been keeping a very watchful eye on the doings of its competitors, and advanced its prices step by step, keeping pace with what was being done elsewhere. Within the last few days it has obtained as much as £5 5s for sheet bars for Swansea, July-December shipment. One of the largest English steel works on the East Coast is now negotiating for round lot of open hearth blooms from an Alabama producer, and whether the business goes through or not depends apparently upon the ability of the latter to book up freight room. The magnitude of the business contemplated is such that it might be a convenient policy for a couple of vessels to be chartered right out. This freight room question has really been a great hindrance, for one American producer recently made firm offers of large lines of semi-finished products at tempting prices, but would only sell at free on board terms, which as events proved were useless to the potential buyers, for they could not move the product from New York to the Bristol Channel except at prohibitive rates.

## Rapid Advance in Finished Lines

Continental finished iron and steel have gone up very fast and it may be questioned if the advance has not been too rapid. Merchants have purchased liberally, and this may sooner or later mean the unloading of material at lower prices than those at which first-hand steel is obtainable, and thus introduce a softer appearance in the market generally. Meantime all plants are working up to the highest point of pressure and cautionary remarks are regarded as the voice of the scoffer.

Of special interest are the last Government labor returns, from which it appears that employment which was very seriously affected by the coal strike had largely recovered by the end of April, though it was still much worse than prior to the strike. The returns show that 209 furnaces were in blast at the end of April compared with 38 at the end of March, 1912, and 301 at the end of April last year. As regards finished iron and steel works, employment at the end of April showed a considerable recovery from the effects of labor disturbance. Indeed the volume of employment for the week ended April 27, showed an increase of 148.2 per cent. on April 1 to 20 and 5.9 per cent. on April, 1911. In the tin plate trade employment at the end of April was good and practically all the mills that had stopped owing to the fuel shortage had been restarted.

Germany's total exports of iron and steel products in April reached 307,001 metric tons, which compares with 363,151 tons in April, 1911. The following details are available: Pig iron, 96,371 tons, against 63,703 tons; semi-manufactured material, 49,593 tons, against 41,958 tons; beams, 46,323 tons, against 28,390 tons; steel rails, 44,445 tons, against 37,403 tons.

## The German Iron Market

Prices Continue to Rise

BERLIN, May 23, 1912.

The strength of the iron market continues unabated. The Steel Works Union to-day made an advance of 5 marks per ton in semi-manufactured material for the next quarter. Quite contrary to expectations, advances in structural shapes were also made. For beams the advance is 4 marks per ton, and for other classes 2.50 marks, with the abolition of a discount of 1½ per cent., making the actual advance on the latter also about 4 marks. The export drawback was reduced 5 marks per ton, corresponding to the rise in semi-manufactured products for the home market. Dealers' organizations have also been raising prices. In the Silesian district bars were marked up 2½ to 5 marks and plates 5 to 7½ marks. At Remscheid saws, axes, and similar hardware have been raised 5 per cent., taking effect immediately. The upward tendency continues also in Belgium. For the home trade both basic steel and iron bars were marked up 2.50 to 5 francs. Export prices f.o.b. Antwerp have been raised as follows: Iron bars, angles, and rods for making bolts, each 2 shillings; basic steel sheets and bands, each 1 shilling; basic steel plates 2 to 3 shillings. Angles and steel tees dropped 1 shilling.

### Brisk Trade in Many Lines

The report on the business situation in A products given out by the Steel Works Union to-day says that the home trade in semi-manufactured material continues quite active in consequence of the brisk employment of consuming mills, and that manufacturers of material cannot in many cases make deliveries on time. The foreign market is described as firm, particularly that of England, where there is a heavy demand since the coal miners' strike terminated. The Prussian railroads, in ordering supplementary amounts of steel rails and ties for the current fiscal year, increased their takings over last year by about 42,000 tons, and a new contract at an advance of 2 marks per ton has been made with them. Further foreign orders for heavy rails have come in and several large contracts are under negotiation. Business in grooved rails has lost nothing of the activity of the early spring season, and orders from both the home and the foreign market are being booked in large amounts. There is now a still better business than hitherto in mining rails, and the mills are not able in many cases to make deliveries within the periods specified. Prices have been raised both for home and foreign delivery. In structural shapes the sluggish pace of the first months of the year has given place to an active buying demand; car shops and construction shops have come forward with heavy orders and the prospects for the summer trade are regarded as bright. From the foreign trade the demand for structural shapes has continued good. Better export prices have been put in force.

The Pig Iron Syndicate met yesterday and gave out a statement, according to which the trade in pig iron remains very active. Home consumers have nearly all covered their requirements for the rest of the year, and not a few have sent in supplementary orders. The foreign demand continues good. Calls for delivery this month are very heavy. Newspaper reports fully confirm this view of the pig iron trade, besides mentioning a scarcity of iron in some cases. The syndicate had to reject some orders for Luxemburg qualities owing to inability of the furnaces to accommodate them. A report from the Silesian district speaks of a growing scarcity of pig iron. The demand for scrap iron continues heavy. The latest auction of old rails and other material by the railroad authorities brought out higher prices.

### Growth of Iron and Steel Companies

The Adolf-Emil-Hütte, which is the name of the great new establishment of the Gelsenkirchen Company at Esch in Luxemburg, has just put its blast furnaces, steel plant and rolling mills into operation. Four furnaces of modern type are in blast, and two others will be blown in later. The steel plant comprises four basic steel furnaces of 24 tons' capacity each, two blooming mills and four sets of finishing rolls.

Capital increases are now the order of the day among iron companies. The Rheinische Stahlwerke decided yesterday to raise 6,000,000 marks new capital, bringing its total capital to 46,000,000 marks, in order to carry through the absorption of the Balcke-Teller-

ing Company, as mentioned in this correspondence some weeks ago. The Hasper Eisen und Stahlwerk has just announced an issue of 3,000,000 marks new stock, making its capital 13,000,000 marks. It is also reported that the Deutsch-Luxemburg Company, already one of the greatest iron and coal concerns of Germany, will bring out 20,000,000 marks new stock in the autumn. This report has been denied by the company, but nevertheless it is believed in the trade to be true. It is known that it has large plans in hand for renewals and enlargements at the old Dortmunder Union, absorbed last year.

## New York

NEW YORK, June 5, 1912.

**Pig Iron.**—The market is rather less active than in the preceding two weeks. So far as Eastern furnaces are concerned, foundry iron transactions have been limited, though first and last considerable business has been done in basic iron in the past ten days. One Lehigh Valley interest which will blow in another furnace has booked about 20,000 tons of basic for delivery at New Jersey and eastern Pennsylvania steel works. Recent transactions in basic have ranged from \$15 to \$15.25 delivered. For foundry iron prices show some variation, the range being about 50 cents. Buffalo furnaces, however, after considerable selling in May, appear to be more uniform in their quotations and \$13.75 at Buffalo for No. 2 X is now a more common minimum than \$13.50. The canal freight from Buffalo to New York ranges from \$1.30 to \$1.40, so that by canal transport some of the Buffalo iron sold in the past month represents quite a little under \$15.25 at tidewater. Inquiry in the New York district has not amounted to a great deal in the past week. Several consumers in New Jersey have been in the market, but in no case for large lots. Virginia furnaces have held quite generally to \$13 at furnace as the minimum for No. 2 X, but production in Virginia has been limited, only four furnaces being in blast the greater part of May, though a fifth was active at the opening of this month. We quote as follows for Northern iron at tidewater: No. 1 foundry, \$15.25 to \$15.50; No. 2 X, \$15 to \$15.25; No. 2 plain, \$14.75 to \$15. Southern iron is quoted at \$15.50 to \$15.75 for No. 1 foundry and \$15.25 to \$15.50 for No. 2 foundry.

**Finished Iron and Steel.**—Though a large volume of business still continues to be moving, there is less new demand even in the light of the reduced rate of recent weeks. There are also signs again of irregularity in prices, due to aggressiveness occasioned by large attractive propositions. For example, good sized orders for plates have lately been settled for nearer the 1.20c., Pittsburgh, basis than the 1.25c. basis. On small lots, however, prices are decidedly strong at the generally accepted levels. About the only division of the market reporting continued brisk business is bar iron, but active figuring is still in progress on structural work. Eastern plate mills have reduced operations to perhaps 85 per cent. of capacity. Railroad car buying is also again looking up, and among the recent active inquiries, some of which, indeed, are about to be settled at this writing, are the following: 1000 steel underframe gondolas for the Central Railroad of New Jersey, 1500 steel underframe box cars for the Frisco System, 2500 all-steel coal cars for the Illinois Central, 50 tank cars for the Grand Trunk and about 30 mail, baggage and passenger cars for the Seaboard and 60 mail, baggage and passenger cars for the Norfolk & Western. Quite a little structural work has lately been closed, including 14,000 tons for the Biltmore Hotel to the American Bridge Company, to be erected by the Terry & Tench Company; 3000 tons for the meter repair shop of the Standard Gas Company, to Milliken Brothers; 2000 tons for the Turkehead Building, Providence, to the New England Structural Company; 2500 tons for a 21-story building at 11 East Twenty-sixth street, to the American Bridge Company; 6000 tons for the so-called catenary bridges for the New Haven to the Jobson-Gifford Company; 1800 tons for the Stetson Building, Philadelphia, to the American Bridge Company; 2000 tons for the Kinney Building, Newark, to the Hay Foundry & Iron Works; 1000 tons for a building for the Edison Electric Illuminating Company, Brooklyn, to the Levering & Garrigues Company, which has 800 tons for a building for the General Electric Company at Pittsfield, and 300 tons for the National Equipment Company, Springfield, Mass.; 1900 tons for the Cramp machine shop, Philadelphia, to the McClintic-Marshall Construction Company; 500 tons for the General Electric Company at Pittsfield, to the Ameri-



can Bridge Company, which also recently took a bridge of about 100 tons for the Central Railroad of New Jersey at Ashley, Pa. Other work reported closed is an apartment house in Philadelphia, 300 tons, a highway bridge at Altoona, Pa., 375 tons, and an apartment at Riverside Drive, 700 tons. The largest new project which has taken definite form is the building for the Adams Express Company, New York, requiring 7000 or perhaps 10,000 tons, and some 1400 tons of steel work for terminal changes to the Brooklyn Bridge, and the New York Dock Company is to erect an 8-story building opposite Pier 5 in Brooklyn. Quotations are: Steel bars, 1.36c. to 1.41c.; plain structural material and plates, 1.41c. to 1.46c.; bar iron, 1.32½c. to 1.37½c., all New York. Plain material from store, New York, 1.75c. to 1.85c.

**Ferroalloys.**—The market on 80 per cent. ferro-manganese is a little easier, although \$48.50, Baltimore, is still quoted for forward delivery. It is reported that some sales of small amounts have been made recently at \$50 for delivery to the end of the year. For prompt shipment from \$50 to \$55 is quoted, depending on time of delivery. Ferrosilicon, 50 per cent., is firmer at \$70, Pittsburgh, although some sellers feel they should get \$72.50 for carload lots. Manufacturers are well sold up and the demand is fair.

**Cast Iron Pipe.**—The most important public business in sight is a pipe laying contract which will be let by the city of New York June 12 and will call for 725 tons of 20 in. The absence of public lettings at this particular time is attracting some comment, but pipe manufacturers are inclined to think that it is merely a coincidence and not to be taken as an indication of a general purpose to refrain from contracting. The private demand continues in about the same volume as heretofore. Carload lots of 6 in. are still to be had from some manufacturers at about \$21, tidewater, per net ton, but others are firmly holding quotations at \$22 to \$23 and report a special stiffening of prices on 4 to 6 in., foundry capacities being quite well filled on small pipe for the immediate future.

**Old Material.**—The week has developed few transactions in any class of old material. Certain features of the trade now seem to indicate quite strongly that prices of steel scrap have seen their maximum for the present and that a lower level of prices may be expected. Rejections have become much more frequent, buyers of steel scrap insisting upon the strictest adherence to their specifications. The supply of not only steel scrap but of all other kinds of scrap has grown much more abundant; in fact, it is stated that quantities are coming out in greater volume than the ordinary channels of distribution can handle. The very fine weather is enabling construction and renewal work to proceed and old material is thus being collected in increasing quantity. The principal steel companies and rolling mills in eastern Pennsylvania are becoming so stocked up that orders are being given to dealers to discontinue shipments. While most varieties of foundry scrap are quiet, a noteworthy demand comes from eastern Pennsylvania for stove plate on which it is possible that \$11 delivered might be secured for a large lot. Dealers' views as to values are a little lower and quotations are now as follows, per gross ton, New York and vicinity:

Old girder and T rails for melting.....	\$10.75 to \$11.25
Heavy melting steel scrap.....	10.75 to 11.25
Relaying rails.....	20.50 to 21.00
Rolling rails (nominal).....	12.50 to 13.00
Iron car axles.....	20.50 to 21.00
Old steel car axles.....	15.00 to 15.50
No. 1 railroad wrought.....	13.25 to 13.75
Wrought iron track scrap.....	12.00 to 12.50
No. 1 yard wrought, long.....	11.50 to 12.00
No. 1 yard wrought, short.....	10.75 to 11.25
Light iron.....	5.00 to 5.25
Cast borings.....	7.00 to 7.25
Wrought turnings.....	8.00 to 8.25
Wrought pipe.....	10.00 to 10.50
Old car wheels.....	13.50 to 14.00
No. 1 heavy cast, broken up.....	11.75 to 12.25
Stove plate.....	9.00 to 9.50
Locomotive grate bars.....	8.75 to 9.25
Malleable cast.....	10.00 to 10.50

The International Iron Molders' Union in the Pittsburgh district has asked an increase in wages of 50 cents a day, or from \$3.50 to \$4, effective June 3. The matter is being submitted to the foundrymen of Pittsburgh and vicinity and a conference will be held with the representatives of the union.

## Metal Market

NEW YORK, June 5, 1912.

### The Week's Prices

Cents Per Pound for Early Delivery.							
Copper, New York.		Electrolytic.		Tin.		Spelter.	
May.	Lake.	May.	June.	May.	June.	May.	June.
31.....	17.00	16.75	45.70	4.20	4.12½	6.90	6.75
June 1.....	17.00	16.87½	.....	4.20	4.12½	6.90	6.75
2.....	17.25	17.12½	46.25	4.20	4.12½	6.90	6.75
3.....	17.25	17.12½	45.75	4.20	4.12½	6.90	6.75
4.....	17.25	17.12½	45.75	4.20	4.12½	6.90	6.75
5.....	17.25	17.12½	45.75	4.20	4.12½	6.90	6.75

Copper has advanced and is strong with little buying. Tin has been active with well sustained prices. Lead is quiet with prices unchanged. Spelter is a little more active with a weaker tendency. Some grades of antimony have advanced.

### New York

**Copper.**—With electrolytic copper quoted at 17.25c. delivered 30 days, or 17.12½c., cash New York, and Lake copper practically nominal at 17.25c., the market shows every indication of continued strength and even higher prices are predicted unless conditions change in a way unforeseen. Every one interested is looking forward to what will be disclosed by the statistics for May of the Copper Producers' Association, which, it is believed, will show a considerable decrease in surplus stocks. It is thought probable that labor troubles which undoubtedly have interfered with production will be reflected in the figures and may be the cause of a decrease greater than expected. The volume of business in the last few days has been small; in fact, there has not been any great amount of business since copper left 16.87½c. The market is one which consumers do not like and they probably will keep out of it until forced to become active. The inadequacy of supply is such as to cause uneasiness among both dealers and buyers. Exports in May aggregate 32,584 tons, or about 73,000,000 lb. In May one year ago exports were 27,670 tons. Estimates place total deliveries in May at 143,000,000 lb. and the production at 130,000,000 lb. The price of spot copper in London to-day is £77 10s., for futures £78 2s. 6d. The exports this month have been 2749 tons.

**Copper Averages.**—The Waterbury average for the month of May was 16.37½c. The average price of Lake copper for May, based on quotations in *The Iron Age*, was 16.30c., and electrolytic, 16.12½c.

**Pig Tin.**—Throughout the week there has been a very fair business done in pig tin, especially for August, September and October delivery. There were good sales made on the floor of the New York Metal Exchange and outside which in the aggregate totaled a large tonnage. On May 31, 130 tons were sold on the floor of the Exchange, on June 3, 225 tons and on June 4, 100 tons. Outside of the Exchange on May 31 about 200 tons were sold; on June 1, about 250 tons; on June 3, about 250 tons, and on Tuesday, about 100 tons. Practically all of the tin sold in New York was the property of London owners. Violent fluctuations have characterized the London market during the week the causes of which are not understood on this side. Reports indicate that the dock laborers' strike in England, which has held up shipments, will soon be terminated and that a healthier movement in tin will be resumed. Tin was quoted to-day in New York at 45.75c. The price in London for spot tin is £200 10s. and futures £194 10s. The arrivals this month have been 255 tons and there is afloat 990 tons. The statistics for the month of May brought no surprises as the deliveries into American consumption were 4250 tons, the arrivals 3190 tons and stocks in warehouses and on landing 2005 tons.

**Tin Plates.**—The New York price of 100 lb. coke plates, as quoted by the lowest dealers, continues at \$3.64. Local jobbers in tin plates are looking eagerly for a more active trade movement in order that they may dispose of their large stocks which they purchased when prices were at a low level and in anticipation of a busy spring season which has been greatly delayed by backward weather.

**Lead.**—Quiet and dull conditions characterize the lead market, to which there has been no feature of special interest in the last week. Prices are unchanged at 4.20c., New York, and 4.12½c., St. Louis.

**Spelter.**—There was a trifle more activity in the spelter market in the last two or three days, but prices, though unchanged, showed a tendency toward weakness. The New York price is 6.90c. and the St. Louis price 6.75c., with special grades running higher. The

May Waterbury average for brass mill spelter was 7.13c.

**Antimony.**—Hallett's antimony has advanced in price and is now quoted at 7.85c. Chinese and Hungarian grades are also up a little and now quoted at 7.25c. Cookson's is unchanged at 8c.

**Old Metals.**—Prices of old copper and brass have again advanced. Dealers' selling quotations are as follows:

	Cents per lb.
Copper, heavy and crucible.....	16.00 to 16.25
Copper, heavy and wide.....	15.75 to 16.00
Copper, light and bottoms.....	14.00 to 14.25
Brass heavy.....	10.00 to 10.25
Brass, light.....	8.50 to 8.75
Heavy machine composition.....	13.25 to 13.50
Clean brass turnings.....	9.75 to 10.00
Composition turnings.....	12.00 to 12.25
Lead, heavy.....	4.00
Lead, tea.....	3.75
Zinc, scrap.....	5.50

#### Chicago

JUNE 4.—A continued advance in the price of copper features the local metal market, which in other respects is without change. We quote as follows: Casting copper, 16.87½c.; Lake, 17.12½c., in carloads for prompt shipment; small lots, ¼c. to ¾c. higher; pig tin, carloads, 47.25c.; small lots, 49.25c.; lead, desilverized, 4.15c. to 4.20c., for 50-ton lots; corroding, 4.40c. to 4.45c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.95c. to 7.05c. Cookson's antimony, 8.50c., and other grades, 8c., in small lots; sheet zinc is \$8.65 f.o.b. La Salle or Peru, Ill., less 8 per cent. discount, in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14.75c.; copper bottoms, 12.25c.; copper clips, 13.75c.; red brass, 12c.; yellow brass, 9.75c.; lead pipe, 3.90c.; zinc, 4.75c.; pewter, No. 1, 28.50c.; tinfoil, 32c.; block tin pipe, 42c.

#### St. Louis

JUNE 3.—Metals have been rather quiet the past week, but are strongly held. Lead is quotable to-day at 4.10c. to 4.15c., with sellers slow to let go. Spelter is 6.75c., for spot with deferred deliveries ranging down as low as 6.50c. Tin has been irregular and is quotable at 44.35c. to 46.10c. Lake copper is held at 17.22½c.; electrolytic, 17.12½c.; Cookson's antimony, 8.35c. In the Joplin ore district zinc blende continues to bring record prices. The top settlement last week was \$61 per ton on an assay basis of \$58.50 for 60 per cent. The range downward was to about \$54 and even undesirable lots brought a good figure. The market is the strongest in the history of the district, although the top basis is 50c. below the record price. The conspicuous feature is the great strength of second grade ores, showing the intensity of the demand. Calamine sold as high as \$35, with an assay basis of \$30 for 40 per cent. The downward range was to \$27. Lead ore sold for \$53 to \$54.50. For miscellaneous scrap we quote as follows: Light brass, 5c.; heavy brass and light copper, 9c.; heavy copper and copper wire, 10c.; zinc, 3.50c.; lead, 3.50c.; pewter, 21c.; tinfoil, 31c.; tea lead, 3c.

## Iron and Industrial Stocks

NEW YORK, June 5, 1912.

Considerable weakness developed last Friday and Saturday, caused by disquieting news regarding certain railroad companies. At this time Can common dropped about \$5 a share and other industrial stocks went off to some extent. With reassuring news the market improved, and prices the early part of this week were much stronger. In Republic preferred an advance of \$4 per share occurred on Monday. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com....	14- 7½	Nat. En. & St., com....	15½- 17
Allis-Chalm., pref....	17- 23¼	Pittsb'gh Steel, pref., 101½-103	
Bald. Loco., pref....	107¼-108	Pressed Steel, com....	33½- 35
Beth. Steel, com....	35½- 37½	Pressed Steel, pref....	102
Beth. Steel, pref....	69¼- 71	Railway Spring, com....	34- 34½
Can, com....	33¼- 39¼	Republic, com....	21¼- 24½
Can, pref....	115¼-117¼	Republic, pref....	76- 80
Car & Fdry., com....	57½- 59	Sloss, com....	49
Car & Fdry., pref....	118¼-120	Sloss, pref....	100
Steel Foundries.....	36- 36½	Pipe, com....	19½- 20½
Colorado Fuel.....	27- 28½	Pipe, pref....	56- 56½
General Electric.....	167- 171	U. S. Steel, com....	66- 70½
Gr. N. Ore Cert.,.....	41¼- 43¼	U. S. Steel, pref....	110- 110½
Int. Harvester, com....	117- 121¼	Westinghouse Elec....	71- 73
Int. Harvester, pref....	119- 120	Chic. Pneu. Tool....	42¾- 48¾
Int. Pump, com....	24½- 28¼	Cambria Steel.....	42¾- 43¾
Int. Pump, pref....	79¼- 80	Lake Sup. Corp....	29½- 31¾
Lackawanna Steel....	31	Pa. Steel, pref....	99¼- 99½
Locomotive, com....	40¾- 42¼	Crucible Steel, com....	12- 12½
Locomotive, pref....	107- 108¾	Crucible Steel, pref....	83¾- 84¾

#### Dividends Declared

The American Car & Foundry Company regular quarterly, ½ of 1 per cent. on the common stock and 1¼ per cent. on the preferred stock, payable July 1.

The International Harvester Company, regular quarterly, 1¼ per cent. on the common stock, payable July 15.

The American Can Company, regular quarterly, 1¼ per cent. on the preferred stock, payable July 1.

The Railway Steel Spring Company, regular quarterly, 1¼ per cent. on the preferred stock, payable June 20.

## Pittsburgh and Vicinity Business Notes

The Westinghouse Electric & Mfg. Company, Pittsburgh, has just received a contract from the Havana Electric Railway Company, Havana, Cuba, to furnish 30 double equipments of No. 323-A motors.

Steps looking toward a reorganization of the Pressed Radiator Company of America, Pittsburgh, were begun last week by the filing of suits against the company by several of the principal directors for amounts advanced by them from time to time and used in the development of the company's business. It is the intention to pay all creditors in full. New capital will be secured, the suits entered being the legal method to be followed in order to place the affairs of the company in proper condition for reorganization. All stockholders have been given an opportunity to become interested in the proposed new company on an equivalent basis with these directors.

The Keystone Steel Casting Company, Avonmore, Pa., has been succeeded by the Kiski Steel Casting Company. The officers of the new company are John Weilersbacher, president, and John Sauer, vice-president, at Pittsburgh; W. S. Beamer, secretary and treasurer, Apollo; and H. C. Barnhart, general manager, Avonmore.

The Westinghouse Air Brake Company, Wilmerding, Pa., has increased its capital stock from \$14,000,000 to \$20,000,000.

The Sterling Steel Foundry Company, Pittsburgh, has increased its capital stock from \$250,000 to \$500,000. It is understood that the company will make some large additions to its plant.

The town of Sharon, Pa., will issue bonds to the amount of \$85,000 for the building of a municipal light plant.

The Wilson-Snyder Centrifugal Pump Company, Pittsburgh, has increased its capital stock from \$25,000 to \$130,000, the increase to be used in purchasing the rights and property of H. D. Wilson.

In May the Bessmer & Lake Erie Railroad, controlled and operated by the Carnegie Steel Company, hauled 23,584 cars, carrying 1,115,000 tons of ore, from Conneaut Harbor to the blast furnaces of the Carnegie Company in the Pittsburgh district. The best former record in one month was made several years ago and was 1,053,000 tons.

The Steel Car Company, Pittsburgh, has applied for a Pennsylvania charter and proposes to manufacture iron and steel and other material for railroad cars, equipment and appliances.

The Duff Mfg. Company, maker of hydraulic jacks, whose plant is located on Marion avenue, North Side, Pittsburgh, has secured four acres of ground adjacent to the proposed new plant of the Pittsburgh Screw & Bolt Company, on which it will erect a new factory. John R. McGinley of the Duff Mfg. Company, who is also chairman of the Pittsburgh Screw & Bolt Company, states that contracts for new buildings, the remodeling of present structures on the ground and the installation of new machinery will be placed in a short time. The new works will give the Duff Company about double its present capacity.

H. K. Porter & Co., Pittsburgh, builders of light locomotives, have started work on the erection of a new machine shop, 100 x 300 ft., three stories. The Pittsburgh Construction Company has the contract for the building and the American Bridge Company will fabricate the steel, about 900 tons, which will be erected by the Lucius Engineering Company, Hartje Building, Pittsburgh. When this building is finished the equipment of the present machine shop will be moved into it and considerable new additional machinery will be installed. Porter & Co. have placed an order with the Pittsburgh office of the Northern Engineer-



ing Works, Detroit, Mich., for the installation of five 10-ton cranes and a contract with the Cooper-Hewitt Company for a lighting system. Elevators will be installed in the building by Marshall Brothers, Pittsburgh.

The Jones & Laughlin Steel Company has not yet blown in its fourth blast furnace at Aliquippa, Pa. The company is now operating five Eliza furnaces, with a daily capacity of about 2250 tons; Soho, with 350 tons, and three stacks at Aliquippa with about 1350 tons, so that it is now making about 4000 tons of pig iron per day. No time has been set for the blowing in of the idle stack at Aliquippa.

### Personal

Charles M. Schwab, president Bethlehem Steel Company, sailed for Europe May 30, to be gone a month, on combined business and recreation.

James T. McCleary, secretary of the American Iron and Steel Institute, is a member of the Christopher Columbus Memorial Commission, having been chairman of the Committee on Library of the House of Representatives of the Fifty-ninth Congress. Under the commission's auspices its monument to Columbus will be unveiled on Saturday, June 8, at the Union Station plaza at Washington.

William C. Redfield, vice-president of the American Blower Company, Detroit, member of Congress from the Fifth New York district, Brooklyn, has announced his candidacy for the nomination for Vice-President on the Democratic national ticket.

Henry Dreses, president Dreses Machine Tool Company, Cincinnati, Ohio, sailed from New York last week for an extended business tour through Europe.

Ambrose Monell, president of the International Nickel Company, New York, has been made president of a newly formed Ontario company, the Canadian Mining & Exploration Company, Ltd., in which American and Canadian capital has joined for the exploitation of Canadian mineral resources. W. E. Corey and E. C. Converse are members of the board of directors.

John C. Dean, secretary and treasurer of the Dean Brothers Steam Pump Works, Indianapolis, Ind., is spending the summer in Europe. He will return about September 1.

The Board of Governors of the Machinery Club of the City of New York, at a meeting held June 4, re-elected the following officers to serve for the ensuing year: President, George A. Post, Standard Coupler Company; vice-president, W. L. Saunders, Ingersoll-Rand Company; treasurer, Charles A. Schieren, Jr., Charles A. Schieren Company, and secretary, Frederic Stadelman, Wellman-Seaver-Morgan Company.

Rudolph Kauert of the firm of Kauert & Doehler, machinery dealers of Montreal and Toronto, sailed from New York June 4 on a three weeks' business trip in Europe.

C. Stanley Martin has been appointed superintendent of the Dominion Iron & Steel Company, Sydney, N. S., succeeding C. H. McMillan, resigned. Mr. Martin was for several years works manager of Cammell, Laird & Co., Cumberland, England, and for the past two years has acted in important consultative capacities in Cardiff, Wales.

Emil Axner, in charge of pig iron sales at Chicago for the Tennessee Coal, Iron & Railroad Company and the Illinois Steel Company, is ill at the University Hospital, Chicago.

William Henry Jennings, for the past 18 years connected with the American Steel & Wire Company, and for a number of years sales agent for western New York, resigned that position May 31 to become general sales manager of the tires department of the Diamond Rubber Company, at Akron, Ohio, which is now merged with the B. F. Goodrich Company.

Allan Fraser, formerly connected with the New York office of the American Steel & Wire Company, has been appointed sales agent of the same company for the territory of western New York, with offices at 666 Ellicott Square Building, Buffalo.

A. H. Vollner, formerly connected with the Cincinnati office of the Domhoff & Joyce Company, dealer in pig iron and coke, has been appointed manager of the

Cleveland office of the company, to succeed R. H. Jenkins, recently transferred to Chicago. His territory will include northern Ohio and the Pittsburgh district.

W. B. Franklin, Western sales manager of the United States Cast Iron Pipe & Foundry Company, with headquarters at Chicago, Ill., has been appointed general sales manager, with headquarters at Philadelphia. Some years ago he was Eastern sales manager, with offices in Philadelphia.

Mano A. Zan, for some time Portland manager for the Meese & Gottfried Company, machinery merchants, is now general sales manager of the company, with headquarters at San Francisco, Cal.

Marston Campbell, superintendent of public works of the Hawaiian Islands, has resigned to become consulting engineer of the Honolulu Iron Works.

C. Powell Karr has been appointed metallurgist of the Standard Chemical Company, Pittsburgh, Pa., miner and manufacturer of vanadium and uranium ores and metals.

John C. Bradley has been elected president and general manager of the Pratt & Letchworth Company, Buffalo, N. Y., effective June 1. The company makes malleable iron and steel castings.

Edward J. Russert has been appointed chief claim agent of the Republic Iron & Steel Company, Youngstown, Ohio, succeeding R. J. Nicholson, resigned.

Frederick A. Peiter, who has been assistant superintendent of construction for the Tennessee Coal, Iron & Railroad Company at Corey, Ala., has been made assistant engineer for the H. Koppers Company and will have supervision of all that company's construction work.

T. J. Drummond, Montreal, Que., president of the Lake Superior Corporation, was elected a member of the Iron and Steel Institute at the May meeting in London.

Frederick W. Job, secretary of the Chicago Employers' Association, recently tendered his resignation, effective June 1, and will resume the practice of law. Mr. Job has carried on the work of the association for twelve years and in that time has had to do with the settlement of more than 300 strikes. William M. Webster, secretary of the Chicago Brass Manufacturers' Association, will succeed him.

Theodore D. Morgan, Sharon, Pa., sailed from New York this week for a South American trip.

### The La Belle Iron Works Capitalization

Mention has been made of the postponement to June 20 of a meeting of the stockholders of the La Belle Iron Works, Steubenville, Ohio, to consider a proposed increase in the capital stock from \$10,000,000 to \$20,000,000, divided into half preferred and half common.

An explanatory statement issued by Secretary H. D. Westfall says that the principal reason for asking the stockholders' approval of the increase in capital stock is that the share capital may be brought into closer harmony with the actual valuation of the property than is the case at present. The company's ore holdings, based upon engineers' reports, estimate 6,000,000 to 8,000,000 tons in the Miller property and 10,000,000 to 12,000,000 tons in the Wacootah property, not taking into account some untested acreage. The coal property consists of 355 acres of coking coal lands in Fayette County, Pa., 200 acres of coking coal lands in Randolph County, W. Va., 5,086 acres of seam and furnace coal in Ohio and Brooke counties, W. Va., and Jefferson County, Ohio, or a total of 6541 acres, all carried in the balance sheet at net cost to the company. From this it is apparent that the value of the company's mineral properties exceeds the figures at which they are carried in the balance sheet by an amount equal to or greater than the proposed capital stock increase. The earnings of the company for the five years ending June 30, 1911, after deducting all fixed charges, including bond interest and also special depreciations of \$250,000 per year, aggregated \$7,658,313.25, or an average of \$1,531,662.65.

Solid-center manganese frogs are said to have lasted over 18 months at points in yards of the St. Louis, Iron Mountain & Southern Railroad, where frogs ordinarily last only 6 months.

## Baltimore Industrial Notes

The Monarch Engineering & Mfg. Company is erecting a new 20 x 50 ft. assembling and storage department and has recently added considerable equipment to its mechanical department. A new air compressor has been installed. A fair volume of business is reported in hand, covering melting, annealing, forging and heating furnaces, as well as enameling, japanning and core ovens. Considerable business for export to Canada and Continental Europe has also been closed.

A certificate has been filed for the incorporation of a company known as the Bigelow Brush Company with a capital stock of \$100,000, to engage in the manufacture of brushes of all kinds. The incorporators, who are also named as the directors of the company, are, William Kleinle, William F. Bigelow, Myer Rosenbush, Edward E. Weiler and Ambrose Vogt. Mr. Kleinle and Mr. Bigelow were formerly connected with the Renuous-Kleinle Company. The new company expects to begin business about August 1.

The Chesapeake Iron Works has taken considerable new business and is operating its plant on a better basis. Recent contracts include the structural and ornamental work for a new passenger station for the Western Maryland Railway at Hagerstown, Md., 175 tons; an office building and station at Wilmington, N. C., 160 tons, for the Atlantic Coast Line; a car barn, 200 tons, for the Columbia Street Railway, Columbia, N. C., and structural work, 100 tons, for a mill for the Riverside & Dan River Cotton Company, Danville, Va. Prospects are considered more favorable.

Riggs, Distler & Stringer are actively engaged in estimating on a number of low pressure heating contracts, power installations, boilers and engines. While considerable business is under negotiation, contracts develop slowly, although sufficient business is in hand to keep them fairly well engaged in the operating departments.

Charles J. Bonaparte has awarded a contract to John Cowan, Inc., for the erection of a three-story brick and stone warehouse, 26 x 186 ft., at 316 Guilford avenue. Plans are by H. Stevenson, architect. Freight elevators are to be installed.

The Ellicott Machine Company reports considerable additional inquiry for heavy dredging machinery, and is running its plant on full time. The new addition at the old quarantine station is now operating practically full on the construction of hulls for dredges.

The T. C. Bashor Company reports a good demand for special fish factory equipment. A fair volume of business in engines is under negotiation, while several boiler installations have been contracted for. The boiler and tank department is actively engaged, with several months active work ahead.

Dietrich Brothers continue actively engaged in their fabricating department. They have received the contract for the steel work for the new Terminal Warehouse, requiring about 500 tons. A number of smaller contracts, ranging from 50 to 150 tons of structural material, have been booked and considerable business is being figured on at Southern points. Large work is not plentiful.

Lion Brothers & Co., Inc., novelty goods manufacturers, will erect an addition to their plant at 33 to 37 South Poppleton street, from plans prepared by McLaughlin Brothers. The addition is to be of steel frame, three stories.

The Maryland Steel Company is planning the erection of a large two-story brick warehouse at its Sparrows Point plant, from drawings prepared by its own architect.

Plans are being prepared by J. E. Laferty for two large additions to the plant of the Baltimore Mfg. Company, one at Bank street and Central avenue, the other at Brune and Monument streets. Both buildings are to be three stories, of fireproof construction and equipped with elevators.

The Thompson Mfg. Company, Newark, Ohio, incorporated recently with a capital stock of \$35,000, has completed its plant and will install three punch presses and additional tools in the near future. It manufactures horse clamps and other metal stampings and also expects to do job galvanizing and stamping of various kinds.

## Iron and Steel Exports and Imports

### April's Exports the Largest Yet Attained

The report of the Bureau of Statistics of the Department of Commerce and Labor for April again shows a marked increase in the exports of iron and steel, the record for the month exceeding anything previously attained. The imports have fallen off, as compared with the figures for March. The total value of the exports of iron and steel and manufactures thereof, not including ore, in April was \$26,789,853 against \$24,474,799 in March. The value of similar imports in April was \$2,058,945 against \$2,192,647 in March.

The April exports of commodities for which quantities are given totaled 257,975 gross tons, against 217,901 tons in March. Details of the exports of such commodities for April and for 10 months of the current fiscal year ended with April are as follows, compared with the corresponding periods of the previous fiscal year:

Commodities	April		Ten Months	
	1912	1911	1912	1911
Pig iron .....	20,804	12,185	130,709	138,790
Scrap .....	10,054	7,416	64,523	43,443
Bar iron .....	1,374	1,521	11,739	15,219
Wire rods .....	6,895	1,651	35,958	14,809
Steel bars .....	14,805	9,239	115,402	110,104
Billets, ingots and blooms .....	24,101	27,447	174,511	146,198
Steel rails .....	35,887	54,182	308,920	322,254
Iron sheets and plates .....	20,952	9,952	146,587	74,157
Steel sheets and plates .....	26,647	23,480	216,998	163,672
Tin andterne plates .....	11,000	6,124	61,758	22,486
Structural iron and steel .....	22,297	19,426	196,397	137,881
Barb wire .....	6,813	6,782	84,572	67,484
All other wire .....	15,900	14,687	111,529	89,994
Cut nails .....	721	778	8,692	8,457
Wire nails .....	10,064	6,288	52,424	43,637
All other nails, including tacks .....	845	1,668	10,422	10,053
Pipe and fittings .....	28,622	22,762	187,945	149,507
Radiators and cast iron house heating boilers ..	194	278	3,555	3,180
Totals .....	257,975	225,839	1,922,641	1,561,291

The imports of commodities for which quantities are given totaled 12,479 gross tons in April, against 15,968 tons in March. Details of the imports of such commodities for April and for 10 months of the current year ended with April are as follows, compared with the corresponding periods of the previous fiscal year:

Commodities	April		Ten Months	
	1912	1911	1912	1911
Pig iron .....	4,683	15,730	92,920	174,822
Scrap .....	1,403	1,591	9,834	21,595
Bar iron .....	1,795	1,236	19,055	25,284
Billets, bars and steel plates, n.e.s. ....	2,462	1,649	20,069	34,163
Sheets and plates .....	490	215	2,228	3,257
*Steel rails .....	60		2,681	
Tin andterne plates .....	125	547	2,687	38,675
*Structural iron and steel ..	200		2,651	
Wire rods .....	1,261	1,422	11,783	15,400
Totals .....	12,479	22,390	163,917	313,196

\*Included in "all other manufactures of" prior to July 1, 1911.

The imports of iron ore in April were 178,502 gross tons against 157,469 tons in March and 133,900 tons in April, 1911. The total quantity of iron ore imported in the 10 months of the current fiscal year ended with April was 1,629,646 gross tons, against 1,707,870 tons in the corresponding period of the previous fiscal year. Of the imports in April 123,670 tons came from Cuba, 54,032 tons from Sweden and 800 tons from other countries, to which amount Canada contributed but 50 tons.

The total value of the exports of iron and steel and manufactures thereof, excluding ore, in 10 months of the current fiscal year ended with April was \$215,307,213 against \$189,798,504 in the corresponding period of the previous fiscal year. The total value of similar imports was, respectively, \$21,610,668 and \$28,691,182.

An unusual form of gas producer has been invented by a German engineer, M. Ziegler, and patented by Wangermann, in which bituminous fuels, like peat, lignite, etc., are treated for manufacturing gas and coke in separate chambers side by side, one chamber used always for gas production and the other for coke making. The producer is intended for use where the demand for power on the gas engine is intermittent, while the plant may remain working at good capacity for making coke.



## New Tools and Appliances

*This is essentially a news department for which information is invited*

**Individual Machine Tool Oil Filter.**—Wm. W. Nugent & Co., Chicago, Ill., have placed on the market an individual oil filter for machine tools which consists of a cylindrical sheet steel tank having a settling chamber at the top for the dirty oil as it drains back from the machine, a nest of three filtering bags in the middle and a storage space for the filtered oil at the bottom. The oil feeds through by gravity and the connections are the suction from the bottom of the tank, the overflow from the pump which also leads to the bottom of the tank, and the drain or return pipe from the machine. The filter can be placed in any convenient location near the machine which it is to serve. The most of the three filtering bags has a somewhat coarse mesh and catches the larger particles in the dirty oil, while the other two are of finer material with a cotton flannel finish on the inside. Each bag is attached to a metal ring and these fit together. A sliding door in the side of the tank provides a means for removing the bags when they become clogged. They are readily cleaned by washing them in kerosene without removing them from the rings. Several sizes of filter are made, the larger ones having a sight glass and a drain cock.

**Annealing Furnace.**—The Wisconsin Foundry & Machine Company, Madison, Wis., has brought out a case-hardening and annealing furnace for which the advantages of a high temperature with a minimum fuel consumption, easy heat regulation for constant temperatures and simplicity in operation are claimed. The furnace proper has a fire brick heating chamber which is entirely insulated from the iron shell by air spaces and asbestos board strips. The furnace door is easily opened or closed owing to the ball counterweight. Two positive pressure blowers are furnished with each furnace, the air and gas entering separately under pressure and passing into a mixer underneath the furnace. A temperature of 2500 deg. is said to be easily obtained and if desired a gasoline priming system can be used for starting the furnace or for enriching poor gas.

**Broaching Machine.**—For key seating comparatively small parts such as the change or feed gears used on various types of machines, the J. N. Lapointe Company, Marlboro, Mass., has designed a light type of broaching machine having a capacity of from 150 to 200 pieces per hour. The maximum width of key way is  $\frac{3}{8}$  in. and from two to four parts can be broached simultaneously. The construction of the machine is very simple and there is a sliding head having a stroke of 30 in. which is actuated by a 2-in. non-revolving screw. This screw passes through a revolving bronze nut which is inserted in the hub of the driving pulley. The arrangement of loose pulleys which are mounted on the hub of the tight pulley and the belt-shifting device is similar to that used on planers. The belts can be shifted by hand or automatically by adjustable dogs. The rod carrying these dogs is connected with two swiveling belt forks and when the sliding head comes in contact with either one of the dogs the proper belt is shifted upon the tight pulley, thus reversing the movement. The stroke of the sliding head is varied by changing the position of the stop dogs to correspond with the length of the broaching tools used. The machine is also adapted for broaching square holes up to  $\frac{3}{4}$  in.

**Cotter Pins.**—Andrew C. Campbell, 65 Bank street, Waterbury, Conn., has been recently granted a patent on a new type of cotter pin which possesses the advantages of being easy to manufacture, simple to use and automatically locking itself in place. This pin is made of a length of round wire which is doubled upon itself so as to form an eccentric eye at one end and have one limb slightly longer than the other. The tip of this end is bent at such an angle that when the pin is driven into place the shorter end will be forced forward past the bent tip of the longer end and spreads the free ends to such an extent that they are wider than the diameter of the hole through which they were driven. It is pointed out that these pins can be made on an automatic wire-forming machine from coils as rapidly and as cheaply as the common cotter pin, having limbs of equal length. When one of these new pins has been thrust into a hole for fastening the part in which

it is placed or for holding a piece on that part it can be given a light blow with a hammer. The force of this blow is transmitted to the shorter limb, which is thus driven farther in and as its tip passes the bent or offset tip of the longer limb, the free ends of the pin are forced apart. In this way the pin is automatically locked in position and cannot be removed until the process is reversed either by driving back the shorter limb or straightening the bent tip.

**Induction Motor Starter and Speed Regulator.**—The Cutler-Hammer Mfg. Company, Milwaukee, Wis., has extended the design of the inclosed drum type controller for direct-current motors which was illustrated in *The Iron Age*, June 29, 1911, to cover several alternating-current types for starting and regulating the speed of crane and hoist induction motors. Non-stubbing fingers of a new design are used which make straightline contact with the segments. An arc-proof shield is mounted under the finger board and is slotted so as to interlace with the deflectors and thus prevent burning of the board and the communication of the arc from one finger to the other. The operation is with an easy and smooth rotary motion and in the starter the resistance is entirely cut out of the rotor circuit when running at normal speed, while with the speed regulator the operating handle may be moved backward or forward according to the variation desired. The resistance used with these controllers varies according to whether the duty which they are to perform is the starting of the motor only or for regulating its speed. The cast metal grids are mounted in special mill end frames on two supporting rods covered with mica tubing and are also insulated from the end frame by fibre washers and tubes. The starters and regulators are arranged to give a 50 per cent. speed variation.

**Switch with Safety Lock.**—An ironclad fused switch, equipped with a padlock for locking the switch in the off position and thus preventing the circuit from being closed when repairs are being made along some part of it has been placed on the market by the Detroit Fuse & Mfg. Company, Detroit, Mich. The switch is operated by a plunger actuated mechanism with rods projecting through the cover of the box. The mechanism, which is controlled by a handle on the outside of the box and carries the fuses, is attached to the inside of a rubber gasketed hinged door and the fuses may be replaced by opening it. When the door is opened all the current-carrying parts are dead and the live connections are all at the bottom of the box, so accidental contact with them is impossible. An eye bolt and wing nut engaging in lugs clamp the cover of the switch shut and by running a car seal through a hole in this nut and a drilled rivet which is fastened to the cover, it is possible to seal the switch so as to prevent tampering with the fuses. The padlock and clamp enable the box to be locked in the off position, a feature which makes the switch ideal for the control of elevators, special machinery or any electrical service where it is desirable to prevent an unauthorized person from closing a circuit. When repairs are being made to a motor or a power or lighting circuit, the person making them can lock the switch in the off position and thus secure protection.

**Loose Pulley Oiler.**—A simple form of loose pulley oiler consisting of a brass tube closed at one end and a wooden plug with a small hole in it inserted in the other is being manufactured by the Butler Chuck Company, Greenfield, Mass. A coil spring which extends the length of the tube is attached to the plug. In use the tube is filled with oil and the tapered end of the plug placed in the oil hole in the loose pulley, the spring exerting sufficient tension to keep the oiler in place between the hub and the rim.

**Bench and Tool Post Grinding Machine.**—The American Electric Tool Company, West Newton, Mass., has brought out a tool post grinding machine which is mounted on a hollow iron base for bench work. By removing two screws on the under side of the base the grinding machine and the tool post bar can be removed and used on the lathe or shaping machine for grinding centers and similar light work. A nut on the rear end of the shaft takes up end play and there is a split tapered bronze bushing at the wheel end. The shaft is off center, thus allowing small diameter wheels to be used. The motor is air cooled by forced circulation.

## Obituary

A. J. WILLIAMS, vice-president Parkesburg Iron Company, Parkesburg, Pa., died at his home May 25. He had been long identified with the iron industry, having been connected with the Hibernia Iron Works, Hibernia, Chester County, Pa., a number of years ago, when it was operated by Charles E. Brooke and continuing after the plant had been acquired by H. A. Beale, Sr. When the plant was moved to Parkesburg, Pa., in 1872, Mr. Williams became its general manager, manufacturing particularly charcoal iron skelp. In 1900 he was made vice-president of the Parkesburg Iron Company, which had been incorporated some years before. He was an authority on the manufacture of charcoal iron skelp, of which his company was an important producer. He leaves a widow, two daughters and a son.

D. H. BURNHAM, Chicago, one of the foremost architects of the world, died June 1 at Heidelberg, Germany, aged 66 years. He was making an automobile tour of Germany, France and Italy. He was born in Henderson, N. Y., removed to Chicago in 1856, and there he received his early education and took up the study of architecture. For many years the firm of Burnham & Root was very prominent in connection with the building of notable structures throughout the United States, the firm name changing to D. H. Burnham & Co. in 1891. More than any other man he was responsible for the magnificent group of buildings constituting the World's Columbian Exposition at Chicago in 1893.

CHARLES E. COFFIN, Muirkirk, Md., died May 24, aged 71 years. He was born in Boston, Mass., and was educated in the Boston grammar and high schools. He removed to Maryland in 1863, and secured the iron works at Muirkirk, known as Muirkirk furnace, erected by the Ellicotts in 1847, and conducted the plant until within recent years. He was a member of the House of Delegates of Maryland in 1884, and served on the ways and means committee, and was elected a member of the State Senate in 1890, serving for four years. He was also a member of the Fifty-third and Fifty-fourth Congress. His son, Ellery F. Coffin, is now operating the Muirkirk furnace.

WILBUR WRIGHT, pioneer of aviation, died at his home in Dayton, Ohio, May 30, of typhoid fever, aged 45 years. It is but seven years since he and his brother Orville first showed the world how to fly by mechanical apparatus. Up to that time many experimenters had struggled with the problem and had built machines that had risen or jumped, but none had learned the secret of sustained flight and of course none had developed a method of directing or controlling an aeroplane. He was born near Dune Park, Ind., and for years he and Orville were repairers of bicycles in Dayton. He ceased public flying in 1910 to give his attention to the building of flying machines for sale.

WILLIAM H. MCCORD, president of Post & McCord, steel construction, 44 East Twenty-third street, New York City, died suddenly at his home in Greenwich, Conn., from a stroke of paralysis, June 4, aged 66 years. He was born in Newburgh, N. Y. He was also president and a director of the Irvona Coal & Coke Company, a director of the Kansas City, Mexico & Orient Railway, vice-president and a director of the Metropolitan Realty Company, and a director of the Merchants' Association of New York. He leaves eight children. His wife died about a year ago.

MORRIS L. STERNBERGER, president Wellston Steel & Iron Company, operating three blast furnaces at Wellston, Ohio, died at his home at Jackson, Ohio, June 2, after several weeks' illness of blood poisoning, aged 51 years. He was associated with Eugene Zimmerman in railroad enterprises, as well as being principal owner of the Wellston Company. He was president and stockholder of the Commercial Bank of Jackson and director and stockholder in a number of Cincinnati banks and in the Superior Portland Cement Company.

THEODORE ALBERT, president William Powell Company, Cincinnati, Ohio, died at the home of a relative in that city May 28, aged 59 years. He was born in Cincinnati, and practically all of his business life was connected with the company of which he was president, filling several subordinate positions in the course of his advancement. He

was a member of several prominent clubs and took an active interest in municipal questions.

GILBERT HART, president Detroit Emery Wheel Company, Detroit, Mich., died May 23, aged 83 years. He was born in Vermont. Locating in Detroit after the Civil War, he started making emery wheels in a small way and later established a large plant. He was active in the management of the business until four months ago, when ill health compelled him to retire. He left no family, his wife and only son having died a few years ago.

WILLIAM C. HORN, Adriance Machine Works, Brooklyn, N. Y., died May 18. He had spent many years of faithful service in the interests of his company.

## The Spanish-American Iron Company and the Cuban Rebellion

Full details are lacking concerning the damage to property of the Spanish-American Iron Company in the Santiago district in the attacks of Cuban rebels, but a Havana dispatch of May 30 reported the burning of company buildings at Daiquiri, where the company's docks are located. The burning of bridges in the same district is also reported. Late last week the Cuban Government furnished a guard for the iron mining properties in the Santiago district and this week some of the Spanish-American Iron Company's miners returned to work. The rebels are now operating in the districts west of Santiago, where the Ponupo Manganese Company's properties are located. There has been no interference with operations at the Mayari mines of the Spanish-American Iron Company.

Through the Merchants' & Manufacturers' Association, the industries of Milwaukee and Wisconsin in general are seeking relief from some of the provisions of a new ruling by the Tax Commission of that State. This new ruling proposes to assess machinery as real estate where the company owns the building in which the machinery is located. Heretofore, machinery has been assessed as personal property and such assessment has been accepted in payment for income tax, dollar for dollar. Under the new ruling the assessed value of the machinery can be deducted, together with other real estate assessments, only from income. Thus the effect of the ruling places a premium upon rented buildings as against buildings owned by the operating company.

A reorganization of the McMyler Interstate Company, Bedford, Ohio, is being planned. A meeting of the stockholders of the company was held June 5 for the purpose of considering the adoption of a proposed agreement for the sale of the company's property. A new company bearing the name of the McMyler Interstate Mfg. Company has been incorporated with a preliminary capitalization of \$5,000.

The Barney & Smith Company, Dayton, Ohio, has issued a statement announcing that the orders now on its books for railroad equipment aggregate \$2,250,000. Inquiries are reported to be better than at any time since 1907.

The Toledo Shipbuilding Company, Toledo, Ohio, has taken an order from the Mackinac Transportation Company for a car ferryboat for delivery December 1. It will be 260 ft. long and 63 ft. deep, with a capacity for carrying 18 standard cars.

The E. & G. Brooke Iron Company, Birdsboro, Pa., has placed in operation five additional puddling furnaces to cover deliveries on orders received for muck bar.

The Illinois Steel Company has taken an order for 4000 tons of open-hearth rails for the Minneapolis & St. Louis Railroad.

A chimney 225 ft. high and 25 ft. in diameter, was recently demolished at Coseley, England. A portion of the foundation was removed in such a way that the structure toppled over full length in one direction.



# The Machinery Markets

Conditions which are generally described as fair continue in the machinery trade in most parts of the country. In some centers May activity equalled or exceeded that of any month this year since January. Three railroads have approached the trade with good sized lists of requirements which encourage as many local markets. In New York there are no new big deals before the trade and "fair" or "only fair" are the words most used in describing the situation. Moderate but steady buying has continued in an uneventful market in New England. While general industrial conditions appear to be stronger in Philadelphia, machinery buying is irregular. In Cleveland, where activity has been of the fair sort, there are some moderately good inquiries and prospects. May was the best month of the year in Cincinnati and continued inquiries and a good export trade are reassuring features, although the last week has been dull. Chicago still has before it the list of the Atchison, Topeka & Santa Fé Railroad, a number of inquiries are pending and a demand is anticipated for manual training equipment. Business has fallen off in Detroit, although the Pere Marquette Railroad is soon expected to be in the market, the receiver having been authorized to make improvements. Quiet conditions are reported in the Central South. Fair demand has existed in Birmingham and business is better in that city than it was a year ago. In St. Louis the month just passed was the best of the year and the trade has before it a list of tools required by the Missouri & Northern Railroad. Pacific coast dealers are estimating on a list of 30 tools for the Oregon Short Line, but otherwise that market is quiet outside of the good demand for wood working machinery and prices are low.

## New York

NEW YORK, June 5, 1912.

The general opinion of the New York machinery trade is that business has been "fair" in the last week, little having developed to change conditions of some weeks' standing. May, with several dealers, has been the best month since January, but a little falling off is thought probable now that warm weather has arrived. No new deals worthy of special mention are before the trade, but small inquiries have continued to come along. Only a few orders have been placed as yet against the list of the Safety Car Heating & Lighting Company for its new plant in Jersey City. The automobile parts manufacturers have contributed in fair degree to activity in the New York market. The Morrow Mfg. Company, Elmira, N. Y., is building an extension to its plant to house automatic machinery principally, and it is understood that the company has or soon will duplicate orders. The Lycoming Foundry & Machine Company, Williamsport, Pa., which specializes in automobile motors and which was referred to as a buyer last week, is reported to have closed repeat contracts for engines and transmission to the value of \$900,000, duplicating business of the last year. The active season in the sugar mill trade is at its height and some good inquiries are reported as before the trade from Cuba and Porto Rico. James H. Fogarty, 126 Liberty street, New York, has secured contracts for two sugar milling plants complete to go to the Philippine Islands and got the business in competition with several European firms. Designs that call for heavier construction and larger journals than ordinary were the deciding factors in this business rather than price, reflecting a growing tendency in the building of sugar mill machinery, which is subject to enormous stresses and strains.

The city of New York is advertising for bids to be submitted before 2 p. m. of Wednesday, June 12, for overhauling and repairing the Worthington high duty 20,000,000 gal. pumping engine in the old Ridgewood (Brooklyn) northside pumping station. The time allowed for completing the work will be 200 consecutive working days and the security required will be \$10,000. Further information can be obtained from Commissioner Henry S. Thompson at the office of the Department of Water Supply, Gas & Electricity, 21 Park row, New York.

J. Chein & Co., manufacturers of toys and other metal novelties, have awarded a contract to E. M. Waldron & Co., Sixth street, Newark, N. J., for the erection of an addition to their plant at 310 Passaic avenue, that city. The addition is to be three stories, of brick construction, and is estimated to cost \$12,000.

The A. & F. Brown Company, Third street, Elizabeth, N. J., manufacturer of power transmission, has commenced work on an addition, 90 x 160 ft., to its plant. The building is to be used for foundry purposes and equipment details are not yet ready.

The George W. Robinson Company, City Island, N. Y., has been incorporated with a capital stock of \$25,000, to manufacture canvas and other fabrics. R. W. France, Brooklyn, and L. A. Watson and C. J. Kulberg, New York City, are the incorporators.

The Board of Sewer Commissioners, Frankfort, N. Y., Everitt J. Brown, clerk, is receiving bids for construction of a sewage disposal plant to be built from

plans of Vrooman & Perry, engineers, Canajoharie, N. Y.

The Thatcher Mfg. Company, Elmira, N. Y., has given the general contract to J. C. Williamson, that city, for the erection of four factory buildings for the manufacture of milk bottles and caps. The buildings will be 154x200 ft., 100x280 ft. and two 50x66 ft. each.

Bids are being received by the Board of Public Works, Ithaca, N. Y., for extensions to be made to the water works pumping station.

The Rochester, Syracuse & Eastern Railroad Company has taken bids for a car repair shop and car house, 176x242 ft., one-story, of brick and steel construction, which it will erect at Newark, N. Y.

The taxpayers of Albion, N. Y., have voted to issue thirty-year bonds for \$130,000 to provide for a municipal water works plant. It is possible the plant of the Albion Waterworks Company, a private corporation, may be purchased and enlarged and additional equipment installed.

The Board of Village Trustees, L. W. Knapp, clerk, Wolcott, N. Y., is advertising for bids for the construction of a small reservoir with standpipe, pump-house, two electric driven power pumps and other accessories for waterworks station; also six miles of cast iron water mains.

The Newell Mfg. Company, Ogdensburg, N. Y., is having plans prepared for a factory building which it will erect and equip for the manufacture of brass specialties, curtain rods and fixtures, etc.

The Long Lake Light, Heating & Power Company, Long Lake, N. Y., has applied to the Public Service Commission for permission to construct an electric light plant at that place and to issue a sufficient amount of its capital stock to cover the cost.

The Burt Olney Canning Company, Albion, N. Y., has let the general contract for construction of its new canning factory which will have about 80,000 sq. ft. of floor space, and will cost about \$200,000. A considerable amount of machinery and equipment will be installed.

The Shults Bag Rack Company, Gowanda, N. Y., is enlarging its factory and installing new machinery.

The Flaxen Fibre Down Company, Lockport, N. Y., manufacturer of fibre down, heretofore controlled by Clay W. Parsons, 111 Main street, and William H. Lee, has been purchased by Canadian capitalists, who will enlarge the company's plant on the Erie Canal, install additional equipment and continue its operation.

The Wilson Lumber & Box Company, Tonawanda, N. Y., has been incorporated with a capital stock of \$100,000, to take over and continue the business of the unincorporated company of the same name. Some improvements are contemplated in the company's plant at Clay and First streets. The new company has elected T. J. Wilson, president, and Frank A. Caldwell, secretary and treasurer.

The extensions which the United States Light & Heating Company will make to its plant at Niagara Falls, N. Y., will comprise seven new buildings and additional stories on two of the present buildings. The new buildings with equipment will cost about \$200,000, and are added to provide room for the manufacture of electric starting devices for automobiles.

The Wegner Dryer Company, Buffalo, N. Y., has

been incorporated with a capital stock of \$50,000, and will establish a plant for the manufacture of machinery and apparatus for the drying and treatment of grain, cereals, etc. M. E. Wegner, F. L. Ellis and D. W. Kellogg are the directors. The company's offices are at 335 Ellicott Square Building.

The Manufacturers' Service Company, 77 West Eagle street, Buffalo, has been incorporated with a capital stock of \$10,000, to manufacture special machinery for automobile factories and power plants. The directors are Walter J. Minehan, Herbert W. Huntington and H. Barton Parry.

The plant of the Modern Laundry Company, Niagara street, Buffalo, was destroyed by fire May 30, entailing a loss of \$65,000 on building, machinery, boilers and engine. The plant is to be rebuilt and equipped at once. The building is to be 150x225 ft., two stories.

The refinery of the Warren Lubricant Company at Maurice street, and the Buffalo Creek Terminal Railroad, Buffalo, was totally destroyed by fire May 28, with a loss of \$140,000 on building, machinery and stock. The plant will be rebuilt at once and new equipment installed.

The Atlas Steel Castings Company, Buffalo, has increased its capital stock from \$100,000 to \$125,000—to provide for plant improvements.

Plans are being prepared for a refuse incinerator plant to be constructed in the Washington street market, Buffalo, in connection with the remodeling of the building upon which work is soon to be commenced, involving the expenditure of \$100,000.

The Hydro-Construction Company, Mutual Life Building, Buffalo, has been awarded the contract for the construction of a sewage disposal plant to be built on Buffalo Creek by the town of West Seneca, a suburb of Buffalo.

The Buffalo General Electric Company, Buffalo, William R. Huntley, president, has had plans prepared for a new power house building which it will erect and equip at East Swan and Center streets. The estimated cost of building is \$25,000.

The Standard Milling Company of New York has completed plans for a large flour-mill elevator and warehouse at Buffalo. The buildings will have a frontage of 80 ft. and a depth of 140 ft. The mill and elevator will be nine stories of steel and concrete construction and a daily capacity of 5000 barrels.

The Remington Arms & Ammunition Company, Ilion, N. Y., has let the contract for the erection of a two-story addition to its machine shop and tool plant.

## New England

BOSTON, MASS., June 4, 1912.

The market is uneventful, with buying steady but moderate. The supply trade has been well ahead of machine tool lines for several years, and possibly it still stands higher in percentage of the maximum. But machinery is now showing the greater gain, as is proved by the experience of houses throughout New England which carry both lines.

It is announced at Springfield, Mass., that the Baush Machine Tool Company will erect a new plant at Brightwood near the works of the Bosch Magneto Company. The plans, as described, call for a building 100 x 300 ft. The new plant of the allied corporation, the National Equipment Company, to be built at Brightwood will consist of a three-story brick building 80 x 360 ft., with a wing 80 x 100 ft. The company states that it has not definitely decided as to what new equipment will be required. The already very complete outfit will be moved into the new building as soon as it is completed.

The Yale & Towne Mfg. Company, Stamford, Conn., will erect a brick factory building 48 x 57 ft., five stories and basement, constituting an extension of an existing structure. Under the new building will be located a concrete storage tank for water. The company states that practically no equipment will be required, as the addition will mean an enlargement of five existing factory rooms.

The G. E. Prentice Mfg. Company, New Britain, Conn., manufacturer of sheet metal and wire goods, states that it will probably be in the market in the near future for power, drop and foot presses and tumbling barrels. The factory is at Berlin, Conn.

The Blakeslee Forging Company, Southington, Conn., is letting the contracts for its new building. The forge shop will be of brick, 50 x 220 ft., one story, with steel truss roof. The machine shop will be of brick and steel construction, 30 x 160 ft., and three stories.

The Turner & Seymour Mfg. Company, Torrington,

Conn., manufacturer of brass and other metal goods, will build an addition to its factory building. One floor will be used for the tool room, one for a shipping room and a third for storage. The company states that it does not plan to add new equipment.

The Pilling Brass Company, Waterbury, Conn., manufacturer of brass, German silver and copper, 8 in. and narrower in thin gauges, will erect a one-story brick building 50 x 110 ft. with steel trusses. Another pair of rolls will probably be installed.

The Cooper Oven Thermometer Company, Pequabuck, Conn., will use the lower story of its new building for a press room and the upper story for office purposes and for an assembling room. The structure will be of brick 34 x 50 ft.

It is announced at Springfield, Mass., that the Hartford Tubing Company has an option on 10 acres of land in East Springfield and contemplates erecting a large plant on the premises. According to this report the plant will consist of a cement factory building 100 x 300 ft., four stories and basement. The site is adjacent to that recently purchased by the Stevens-Duryea Company, which is erecting a large factory building on the premises. However, the decision of the Hartford Company is not yet final.

Plans are completed for the new factory which will be built at Waterbury, Conn., by Andrew C. Campbell. It will be 32 x 126 ft., three stories.

The F. A. Whitney Carriage Company, Leominster, Mass., will erect a new building 40 x 90 ft., two stories.

B. N. Beard, Shelton, Conn., will build a factory 40 x 90 ft., two stories, which will be occupied by A. H. Lavietes Company, Andover, Conn., manufacturer of baskets and similar goods. A steam plant will be installed and the machinery will be operated by motors.

The Eastern Machine Screw Company, New Haven, Conn., will build an addition to its factory, 50 x 60 ft., one story.

The contract has been let for the new factory of the General Electric Company at Pittsfield, Mass. The building will be 125 x 325 ft., of brick, concrete and steel.

The construction of the \$3,000,000 locomotive and car repair shop of the Boston & Maine Railroad at North Billerica, Mass., has progressed to the point of placing the contract for pedestal concrete piling and capping. The ten large shop buildings will cover about 150 acres. The matter of specifications of equipment is already under consideration and some of the large machine tool builders and dealers are preparing to bid on the lists when they are out. The aggregate of purchases will run into several hundred thousands of dollars, some estimates placing it as high as \$1,000,000.

## Philadelphia

PHILADELPHIA, PA., June 3, 1912.

Business the past month, while showing occasional spotty movement, has not been of large volume. The demand has been good along particular lines but the general line of tools has not been especially benefited. Considerable scattered inquiry is still before the trade, but there is little in the way of general shop equipment of any size under consideration. While some few groups of tools have been sold, the bulk of the business is still confined to single tools. Machine tool builders making both standard and special equipment have been better engaged, but in many cases report a falling off in orders toward the close of the month. Some of the smaller builders of such tools and machines are quite busy. Purchases of tools by railroads have been on a very light basis and from present indications do not promise any very active movement in the near future. General industrial conditions appear to be stronger, although in only a few branches of the iron and steel trade are plants operating on full capacity basis. The outlook for continued activity is more favorable, although it will probably be some time before all branches of the trade feel the effect of the improved conditions. A moderate volume of business is pending in boilers and engines, some few contracts having recently been placed, although, generally, business develops slowly. The demand is not active for second-hand boilers, engines and machinery, but in some lines a fair amount of inquiry is pending.

Very little movement is reported in the export trade, except in established lines such as power transmission equipment, which is reported on about an even basis.

The foundry trade shows a moderate improvement, steel casting plants are more actively engaged, while some betterment is also shown in the productive rate of gray iron foundry.



The Earle Gear & Machine Company reports inquiries numerous and the outlook for business quite favorable. It has several large contracts for bridge operating mechanism, covering the hand rail gearing for the Panama Canal, the Gatun Bridge for the Panama Railroad, and the St. George Bridge, Staten Island, for the Baltimore & Ohio Railroad, together with sufficient special work and gear work to keep the plant operating on double turn.

The R. S. Newbold & Son Company, Norristown, Pa., has shipped to the Allegheny Steel Company, 200 ft. of conveying table for a plate mill. It has been quite busy on circular cutting shear, plate shears and leveling machines and has quite a number of orders on hand.

Local contractors are figuring on a power house, 40 x 50 ft., one story and basement of concrete and brick for the Harwood Electric Company, Harwood, Pa., from plans by the Scofield Engineering Company.

The Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa., is operating its various departments on a materially better basis and has recently entered contracts for machinery parts for the Northern Iron Company, Port Henry, N. Y., and also from the Lehigh Coke Company. A good volume of business has been done in Aldrich pumps, two large pumping machines having recently been shipped for export to Australia.

The Philadelphia Rubber Works, Thirty-seventh and Reed streets, has contracted with Stuckert & Sloan for a three-story addition, 40 x 75 ft. It will be used for general manufacturing purposes and will be equipped with special rubber working machinery, which is being built in the company's own shops.

The Lancaster Foundry Company, Lancaster, Pa., is putting in a new air furnace, annealing ovens and other apparatus necessary for the operation of a complete malleable iron castings plant having a capacity 10 tons per day.

The Nicetown Plate Washer Company, Nicetown, Philadelphia, is offering for sale its plant at Juniata and Clarissa streets. The plant includes a complete 10-in. rolling mill equipment and necessary machinery, boilers, etc., together with a fully equipped machine and blacksmith shop. The plant has a capacity of 10,000 to 12,000 tons of bars and 20,000 kegs of washers annually.

The Light Mfg. Company, Pottstown, Pa., is operating its plant to its full capacity and has sufficient work ahead to keep it busy for at least six months. This concern, after considerable experimental work, has taken up the manufacture of die castings, specializing particularly on bearings and such other parts connected with automobile work.

The Lehigh Valley Transit Company, Allentown, Pa., is taking bids for the construction of the South Eighth street bridge in that city. It will extend about one-half mile and will be 120 ft. above low water mark in the little Lehigh River. It is to be of reinforced concrete 48 ft. wide.

Plans have been prepared and approved by the city of Chester, Pa., for the construction of a double deck pier at the foot of Market street, that city. It will be of structural steel and concrete and bids will be asked for at an early date.

The Pennsylvania Equipment Company, West End Trust Building, Philadelphia, Pa., is in the market for a 110-ton Vulcan steam shovel, Class B or its equivalent.

## Baltimore

BALTIMORE, Md., June 4, 1912.

Business transacted in the general machinery lines in May hardly measured up to the anticipated volume. A fair quantity of orders were taken, but they were mostly small. Inquiries for machinery and tools have been fairly active, but prospective buyers have shown little urgency in the placing of contracts. Few inquiries covering any general equipment installations have developed, the demand being largely for single tools for minor extensions and replacement. Tool builders generally report easier buying, although they continue fairly active with contracts already on books. Railroad buying continues along very narrow lines. Special machinery has been moderately active, but generally speaking this class of business also shows a slight recession. Contractors' equipment is in some demand, as the season for outdoor work, which was greatly delayed during the spring months, has become more advanced. While purchases of shop supplies are numerous, quantities taken are usually small. There has been a better volume of business moving in lines identified with building work, and considerable warehouse and factory building is under way, covering ele-

vator, low pressure, steam heating and electrical installations. Fabricated structural material work is also more active, and while a large share of the work is confined to small buildings, a number of propositions requiring several hundred tons of material have been closed. Fabricating shops are, generally, more fully engaged than they were a month ago. A moderate amount of boiler and engine work is under negotiation, but this class of work has been extremely slow in closing. Gray iron foundries, while in instances somewhat better engaged, are not active, operating usually considerably under the normal productive rate. While the month's business generally has only been fair, the trade looks forward to better conditions.

The American Propeller Company, manufacturer of aeroplane propellers, has leased for a term of years a three-story warehouse and factory building at East Hamburg and William streets, where it will shortly begin the manufacture of its product.

The Maryland Basket Company has practically completed the equipment of its new plant on East Falls road. A large share of its machinery was removed from its former plant.

Bids are being prepared by local contractors for the erection of the new office building for the Title Guarantee & Trust Company, at St. Paul and Lexington streets, from plans by Joseph Evans, architect. The building will be seven stories, of brick, granite and terra cotta, and will require the usual elevator, power, heating and lighting equipment.

The Eastern Motor & Conveyance Company is planning to build a public garage at Fayette street and Philadelphia avenue, East Baltimore. Plans are by John Stone, architect, and call for a one-story building of brick and reinforced concrete, 50 x 122 ft.

The Caroline Foundry Company has acquired the plant of the Larabee Iron Foundry at Lancaster and Dallas streets, together with all the equipment, and will continue to operate the iron foundry and is adding a brass foundry department. It is also probable that a machine shop will be installed. William T. Krause is president of the company.

The Aumen Machinery & Supply Company, 324 Holliday street, which was succeeded by the Aumen Machinery Company, 107 East Lombard street, has now vacated the building occupied at the former address, a large share of the machinery and supplies carried by the former concern being disposed of. The new company reports a fair volume of business in both wood and metal machinery, with numerous inquiries for various classes of equipment. Metal working equipment has, however, been in better demand than has wood working machinery.

Eben B. Hunting has awarded a contract to E. L. Walsh for the erection of two large warehouses on Gay street near Water street. The buildings are to be of brick and of heavy mill type construction. They are to be 33 x 84 and 55 x 84 ft., respectively, and will have steam heat, elevators and fireproof sheet metal shutters.

Crook-Kries & Co. will install a 600 hp. Wetherill Corliss engine and also have considerable high pressure piping work under contract for the Knox Net & Twine Company. Their various departments are busy and a moderate volume of miscellaneous power and heating equipment is being received, as well as estimated on.

The contract for the new factory for McCawley & Co. at Exchange place and Commerce street has been awarded to the West Construction Company. Plans are by Otto G. Simonson, architect, and call for a six-story reinforced concrete building, 87x105 ft., equipped with elevators, steam heating, electric lighting plant and a sprinkler system.

The Harlan & Hollingsworth Corporation, Wilmington, Del., is now replacing its old West and East car shops by a modern steel and concrete building, 250 x 360 ft. Its mold loft and punch shed are also being increased and will have on completion a total length of 430 feet. A large addition to the tin and copper shops is planned, but will not be made until later in the year. Operations are now under way for the erection of a new steel and concrete truck shop, 75 x 160 ft. This concern has been extremely busy and is keeping ahead of the demands upon its plant by increasing its various departments.

The Hilles & Jones Company, Wilmington, Del., reports a material improvement in business in the past month. Its shops are running full time and full handed. One of the notable contracts received was for the entire punching and shearing machinery for the new shops of the Delaware & Hudson Railroad at Watervliet, N. Y.

## Cleveland

CLEVELAND, OHIO, June 4, 1912.

Business with local machine tool dealers in the week was only fair. Orders were nearly all for single tools, but several of these were for large sizes. The demand for boring mills is holding up well as the result of order-growing out of the rubber tire industry. Some new inquiries for lots of three or four various tools have come out. Among the prospective business is machinery that is expected to be purchased shortly for a plant that will be built in Ohio by the manufacturer of a new motor truck. This company will probably make an initial purchase of machine tool equipment aggregating \$25,000 to \$30,000. While the volume of business during May was not as large as some dealers looked for the aggregate sales were about the same as in April. A fair amount of second hand machinery is moving. In handling equipment some good inquiries have recently come out for coal and ore handling plants and there is a fairly good demand for small equipment. There is a fair demand for electrical and power plant equipment, mostly for small installations.

The Pond Creek Coal Company, in which Cleveland capital is largely interested, is planning the development of large property in Pike county, Ky. The company will shortly begin the erection of a power plant with a capacity of 1200 kw., which will later be enlarged. Plans for this plant have been prepared by Albert N. Allen, engineer, Cleveland. Orders for the power plant equipment, including transmission system, substations, etc., have practically all been placed. Eight coal tipples will be erected on the property by the company.

The Cleveland Construction Company, Cleveland, Ohio, is placing contracts for a steam turbine power plant of 2000-kw. capacity, machine shops, car barns and an office building for the Mesaba Railroad Company at Virginia, Minn.

Proposals will be received at the office of W. J. Springborn, director of Public Service, June 12, for electric generating equipment for the waterworks department, Cleveland. The equipment to be purchased will be one 1200-kw. or two 600-kw. units, which will include steam turbines with electric generators, condensers, circulating pumps, condensate pumps, exciter, switchboard, panels, etc. The specifications call for alternating current, 2300-volt, 3-phase, 60-cycle generators.

The Forest City Engineering Company, Cleveland, has prepared plans for a new factory building to be erected by the Lincoln Electric Company at Kelley avenue and East Thirty-eighth street. The building will be a one-story structure of brick, steel and cement.

The Wise-Harold Company, New Philadelphia, Ohio, which was recently organized to build vacuum cleaners and other products, has completed a factory building which will be placed in operation as soon as machinery is installed.

Bids will be received by W. J. Springborn, director of Public Service, Cleveland, June 22, for the installation of a refrigerating system for the new West Side market house.

Akron, Ohio, has authorized a \$1,250,000 bond issue for the extension of its waterworks system.

The Fuerst-Friedman Company, 2213 East Ninth street, Cleveland, is offering for sale the plant of the Mann Indicator & Mfg. Company, Alliance, Ohio, which it recently bought. Bids will be received for the entire plant or any part of it.

The Pennsylvania Railroad Company will build a new machine shop on the lake front near West Boulevard, Cleveland. The building will be 65 x 70 ft. and one story, of steel and concrete construction.

The Standard Malleable Iron Company, Columbus, Ohio, has been incorporated with a capital stock of \$10,000 by F. A. Miller, W. M. Deeds, R. H. Platt, J. M. Henderson and R. C. Vance.

The Ideal Commercial Car Company, Akron, Ohio, has been incorporated with a capital stock of \$200,000 by H. C. Gates, A. J. Dettoff, Maynard Stump and others to manufacture motor cars.

The Cement Products Machinery Company, Columbus, Ohio, has been incorporated with a capital stock of \$50,000 by Walter F. Felton, C. C. Florida, W. H. Sharp, L. N. Ferguson and E. B. Taylor.

The Kanneberg Roofing & Ceiling Company, Canton, Ohio, has been reorganized. J. E. Milner, who has been connected with the company for several years, has been elected secretary and treasurer. M. E. Moore has become sales manager.

## Cincinnati

CINCINNATI, OHIO, June 4, 1912.

The majority of machine tool builders report the month of May as being the best one of the present year, while a few claim that business during that month was better than for any similar period since the boom times of 1907. However, the past week has developed a lull in some quarters in actual business placed. Inquiries are coming in freely, but buyers evidence a tendency to hold back orders. The railroads continue their policy of buying tools in small lots. The export trade is good, most of which comes from Europe.

Small electrical equipment is in fair demand, but the larger units are slow sellers. Rebuilt second-hand machinery of all kinds is moving better than for some time past.

The Dreses Machine Tool Company, Cincinnati, has made arrangements to increase its capacity, and has acquired additional warehouse space, thus allowing it to use its present plant entirely for manufacturing purposes.

The Nimmo Fence & Wire Works Company, Cincinnati, has let contract for the erection of its proposed factory at Oakley, recently mentioned, to the Oakley Park Company. Work on the foundations will be begun within the next few days.

Walter G. Franz, Union Trust Building, Cincinnati, is receiving estimates on the power and heating equipment for a large building to be erected at Tuskegee, Ala.

The Automatic Gas Safety Valve Company, Clyde, Ohio, has been incorporated with \$10,000 by I. L. Cleveland and others. Nothing is yet known as to manufacturing plans.

It is reported by the daily press that the Louisville & Nashville Railroad Company is in the market for about 8,000 tons of structural material for doubling the width of its bridge across the Ohio River at Cincinnati. Purchasing offices are at Nashville, Tenn. It is also rumored that the company will construct new shops at Irvine, Ky.

The proposed addition to the plant of the Victor Safe & Lock Company, Norwood, Ohio, recently mentioned, will be of brick and steel construction, 100x300 ft., two stories.

It is probable that the City of Cincinnati will soon be in the market for structural material to construct a reinforced concrete viaduct connecting Evanston and Hyde Park.

The Globe Automatic Sprinkler Company, First National Bank Building, Cincinnati, has been incorporated with \$1,000,000 capital stock, to manufacture an automatic sprinkler head. It has acquired the old plant of the H. C. Hazen Company on Reading road, that will be fitted up with the proper manufacturing equipment. The company already has a plant at Milwaukee, but will move all the machinery to the new location. Considerable additional equipment will be required.

On June 1 fire destroyed the paint shop, fence works and shipping rooms of the Stewart Iron Works Company, Covington, Ky. The loss is estimated at \$80,000, fully covered by insurance. Plans are already under way for rebuilding the plant, for which considerable iron working machinery will be required.

The Edgemont Machine Company, Dayton, Ohio, has had plans prepared for a two-story brick plant, to be erected on National avenue.

The Cincinnati Commercial Association will spend June 11 inspecting the numerous new factories in Oakley suburb. Philip O. Geier, Cincinnati Milling Machine Company, will have the party in charge.

## Chicago

CHICAGO, ILL., June 3, 1912.

Sales by local machinery houses in May compared favorably with the previous months of the year and there is carried over into June sufficient inquiry and unclosed business to warrant a hope for a satisfactory volume in the next 30 days. The expected purchases by the Santa Fe Railroad have not yet been made and in Michigan and Wisconsin three or four transactions aggregating over \$10,000 are still pending. Interesting inquiry has developed for manual training equipment. A transaction at Cornell, Wis., involving machinery to the value of about \$3,500 was closed and the leading agricultural implement interest bought two gear-hobbing machines. A number of plant additions which will be followed by the purchase of woodworking machinery are noted. There is likewise a large amount of



building for various purposes for which power and electric generating machinery will be required.

The Commonwealth Edison Company is understood to have acquired property at South Chicago as a site for the building of a future power house of a size adequate to accommodate the needs of the local railroads that electrify their terminals.

C. S. Frost is the architect for a 12-story manufacturing building to be built at 706 Federal street for Harriet D. Borland.

The Chicago Rawhide Company will build at 1301 Elston avenue a four-story brick addition to its factory 50x140 ft. to cost \$34,000.

The Albert Dickinson Company, dealer in seeds, has bought about 50 acres on the south side of the Drainage Canal on the Pan Handle Railroad and jointly with the Chicago Dock Company will build warehouses to cost in the neighborhood of \$500,000.

C. H. Besly & Co., with offices at Chicago and plant at Beloit, Wis., are negotiating for adjoining property on which to build an addition to their plant. Plans now in contemplation involve the erection of a structure 70 x 260 ft., three stories.

The Cairo Light & Power Company, Cairo, Ill., has let contracts for the building of a \$60,000 power house in which will be installed machinery, the estimates covering which approximate \$175,000.

The city of Wheaton, Ill., is preparing to add to its high school a manual training department for boys and will buy equipment. The City Council has the financing in charge.

The Bradley Mfg. Company, Bradley, Ill., will erect an addition to its plant to consist of a building 80 x 400 ft., five stories, the main floor to be used as a woodworking shop. It will be of steel construction and is a part of improvements upon which it is expected \$400,000 will be spent. The plant is controlled by Sears, Roebuck & Co.

The Chicago Heights Boiler Works, Chicago Heights, Ill., has under construction a new shop, 50 x 100 ft., of brick and steel. As this represents a considerable enlargement of this company's previous plant in which a large portion of the work was done by hand, new equipment will be required.

The Centralia Paper & Pulp Company, Grand Rapids, Wis., suffered a loss of nearly \$100,000 in the destruction of its machine room by fire.

The Maynard Steel Castings Company, Milwaukee, Wis., has been incorporated with a capital stock of \$10,000 by E. E. Shields, L. Bergner and Julius K. Fons.

The National Brake & Electric Company, Milwaukee, Wis., is having plans prepared for the building of a new iron foundry. It will be 120 x 240 ft. and one story.

The Roddis Lumber & Veneer Company, Marshfield, Wis., is building an addition to its plant.

Fairbanks, Morse & Co., Beloit, Wis., are preparing plans for the building of an addition to their foundry during the present summer.

The Aberdeen Light & Power Company, Aberdeen, S. D., proposes building an electric light and power plant in that city.

White, S. D., is considering the installation of a municipal waterworks system.

## Detroit

DETROIT, MICH., June 4, 1912.

Business with the local machine tool houses has shown somewhat of a falling off the past week, although totals for the month have been of a generally satisfactory character. Inquiries are not especially plentiful and are confined mainly to single tools involving both metal and woodworking equipment. The receivers for the Pere-Marquette Railroad have been authorized to make a considerable expenditure for equipment, and while this will probably not involve many tools a number of roundhouses will be equipped and some improvement is expected to be made in the coal handling plants. The second-hand machinery market is fairly active, good used tools being in good demand. General industrial conditions continue satisfactory, the railroad equipment companies, shipbuilding companies and brass working companies being especially active. Building circles have lapsed into a condition of comparative quiet.

The George H. Clippert & Bros. Brick Company has purchased a large tract adjoining its present plant in Springwells, a Detroit suburb, and construction work will soon be started on a new brick making plant which will have a capacity, it is understood, of 100,000 brick per day.

The Detroit United Railway, which operates the

city's street railroad system, is having plans prepared for the first of its new buildings which are to be erected at its new car repair plant in Highland Park. The structure will be 208 x 289 ft. and one and two stories. The other sections of the plant which will be erected later will include a foundry, carpenter and machine shop and truck shops.

The Cadillac Motor Car Company, Detroit, has taken out a permit covering the erection of a one-story brick shop 70 x 120 ft. at Amsterdam and Cass avenues, to cost \$4,000.

B. Siegel, Detroit, will erect a large automobile service building at Fort and Twelfth streets, in which a complete repair shop will be installed.

The Wyandotte Foundry Company, Wyandotte, Mich., has filed amended articles of incorporation, increasing its capital stock from \$26,250 to \$50,000.

The Chevrolet Motor Car Company has about completed arrangements for the building of its new plant on Woodward avenue, Highland Park, where it owns a tract of 51 acres. It is estimated that the buildings will cost \$400,000.

The Ritter Cigar Box Company has been incorporated with \$15,000 capital stock to manufacture cigar boxes and other wooden receptacles. The incorporators are Henry G. Ritter, Harry W. Buckley and William F. Ahrens.

William Nixon and Robert Glascoff, Albion, Mich., have purchased part of the plant of the defunct Cook Mfg. Company in that city from the C. C. Wormer Machinery Company and will operate a foundry.

The Argo Electric Vehicle Company, Saginaw, Mich., maker of electric automobiles, will erect an addition to its factory which will practically double its capacity.

It is announced that the plant of the A. B. Stove Company will be enlarged by the erection of an addition which will increase the capacity 50 per cent.

The New Way Knitting Company, Williamston, Mich., has acquired a plant in Grand Rapids, Mich., and will move to that city. The manufacturing facilities of the company will be greatly increased. O. C. Trask is general manager of the company.

The Calhoun Photo Material Company, Grand Rapids, Mich., has been organized with \$15,000 capital stock to manufacture photo paper. The incorporators are J. C. Calhoun, E. A. Clements and Frank Meyers.

The Southern Michigan Utilities Company, Adrian, Mich., has been organized with a temporary capital stock of \$1,000, which it is announced will be largely increased in the near future. The company is incorporated for the purpose of carrying on an electric, gas light and power business and the incorporators include J. H. and H. A. Fee and L. B. Schneider, all of Tecumseh, Mich.

The Village Council of Rogers City, Mich., is contemplating the installation of a municipal waterworks plant.

## Indianapolis

INDIANAPOLIS, IND., June 4, 1912.

Warren H. Simmons, of the Bemis Bag Company, has been elected president of the Manufacturers' Association of Indianapolis; George O. Rockwood, of the Rockwood Mfg. Company, was elected third vice-president; Henry H. Davie, of the W. D. Allison Company, secretary.

The American Piston Company, Indianapolis, has increased its capital stock from \$30,000 to \$50,000. V. D. Morrison is secretary-treasurer.

The Folding Crate Mfg. Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture folding crates. The directors are W. C. Mitchell, J. H. Mitchell and S. R. Conrey.

The Builders' Supply Company, Indianapolis, has been dissolved.

W. K. Cooper has been appointed receiver for the Indiana Lighting Fixture Company, Indianapolis, manufacturer and dealer in lighting equipment.

The Great Western Pottery Company, Kokomo, Ind., has increased its capital stock from \$80,000 to \$600,000.

The Foerschner Coal Company, Linton, Ind., has bought land in the coal fields near that city and will strip the land that covers the coal with steam shovels, the first experiment of that kind in Indiana. The soil has been contracted for to go to Chicago to fill in the lake front.

The Bruner Mfg. Company has been incorporated at Marion, Ind., to operate a general machine shop. The directors are S. E. Bruner, Wm. Guthrie and J. P. Myers.

The W. McMillan & Son Stone Company, Bedford,

Ind., will open a new quarry on 40 acres of land recently purchased near the city.

The South Bend Sash & Door Company, South Bend, Ind., has been incorporated with \$30,000 capital stock to operate a planing mill. The directors are P. F. Ahrens, G. L. Ahrens and L. E. Golightly.

The Goshen Public Service Corporation, Goshen, Ind., has been incorporated with \$10,000 capital stock to supply water, light, heat and power. The directors are M. O. Payne, C. E. Scott and W. I. Stonex.

The Montpelier Traction Company, Montpelier, Ind., has been incorporated with \$15,000 capital stock to build a traction line from Montpelier to Marion, Ind. The directors are C. L. Smith, A. H. Bonham and N. W. Lacey, Montpelier; D. E. Binns, Elrichville, and A. Evans Townsend, Doyleston, O., chief engineer. Mr. Binns is treasurer of the New York Engineering & Construction Company.

The Board of Public Service, Ft. Wayne, Ind., will shortly place orders for power equipment for the municipal lighting plant. This will include 1000-hp. boilers equipped with superheaters and stokers.

The Tri-State Trust Company, Ft. Wayne, Ind., has been appointed receiver for the Kerr Murray Mfg. Company, Ft. Wayne, manufacturer of gas holders and gas-making machinery. The company has \$300,000 capital stock and \$300,000 in bonds. It has \$150,000 of contracts on hand and the receiver was instructed to continue the plant in operation. The owners are Alfred D. Cressler and his three sons.

The Fayette Mfg. Company, Connorsville, Ind., has been incorporated with \$10,000 capital stock to manufacture woodenware and other articles. The directors are W. O. Hall, J. H. Johnson, L. H. Warren, H. K. McMahan and Oliver Jordan.

## The Central South

LOUISVILLE, Ky., June 4, 1912.

Conditions in this market continue quiet, in line with the situation as reported during the past month. Comparatively few inquiries are being received, indicating that many buyers are holding up improvements until later on. In a good many lines the active buying season is over, so that there is no reason to expect anything more than a seasonable dullness.

A splendid field for the sale of oil engines has been found in the small flour mills in this part of the country. Most of these plants are too far from central stations to get electric current other than of their own manufacture, and as the use of electric motors is becoming more popular the millers as a rule are ripe for suggestions as to changes in their power plants. As the use of low-grade oil as fuel enables them to manufacture power at an extremely economical charge, engines consuming oil have been installed in a number and the trade is steadily increasing.

The Standard Sanitary Mfg. Company has installed three Warner & Swasey lathes in its Louisville plant. The sale was made by E. D. Morton & Co.

The Kentucky Cold Storage Company, Louisville, has been organized with \$10,000 capital stock and a debt limit of \$500,000. J. T. Sullivan and others are the incorporators. The company has taken over the plant of the old Kentucky Packing Company, and has repaired its ice machinery. Additional refrigerating equipment will probably be required a little later on.

The Bradford Worsted Spinning Company, Louisville, is considering an increase in its capital stock from \$250,000 to \$500,000. In the event the increase is provided for a new plant will be erected. The improvements are being held up to await developments along the line of tariff revision.

McDonald & Dodd, Louisville architects, will receive bids in a few weeks on the mechanical equipment of the new Louisville Y. M. C. A. building. It has not yet been decided whether the building will have its own power plant.

The Evans Chemical Works, Nicholasville, Ky., is in the market for a second-hand air compressor with a capacity of 60 cu. ft. per minute.

T. H. Callahan, Paducah, Ky., is considering the establishment of a shoe factory in that city. Plans for the factory will be developed early in the fall.

The Owensboro Steel & Iron Works, Owensboro, Ky., has been awarded the contract for the erection of the structural iron work on the warehouse of the Farmers' Loose Leaf Tobacco Warehouse Company, Carlisle, Ky.

Two electric light plants may be installed at Cadiz, Ky. A. P. White & Co., who are erecting a large flour mill, are making arrangements with L. S. Ragsdale,

Pembroke, Ky., whereby the latter will operate an electric light system with current furnished from the power plant of the milling company. Alexander Bros., who have a franchise for an electric light plant in Cadiz, have announced that they will arrange to operate early in the fall.

W. W. Tarbell, J. C. Hydrick, and others, Prestonburg, Ky., are planning the installing of oil drilling plants for the development of property in that section.

The Fiscal Court of Bullitt County, Shepherdsville, Ky., is considering the purchase of road machinery. LeRoy Daniel, county judge, is in charge of the purchase.

Armour & Co. plan the enlargement of their refrigerating plant at Lexington, Ky. The storage and handling capacity of the plant will be greatly increased.

The East St. Louis Cotton Oil Company, East St. Louis, Ill., and the Roberts Oil Company, Memphis, Tenn., are reported to be considering the establishment of oil mills at Hickman, Ky.

The vehicle factory of the Hardy Buggy Company, Paducah, Ky., was destroyed by fire with loss of \$50,000, all of the machinery being a total loss. W. G. Hardy is president of the company, which is now considering plans for rebuilding.

It is reported that the Virginia & Carolina Chemical Company, a large soap manufacturing concern, is planning the erection of a \$150,000 factory at St. Bernard, a suburb of Covington, Ky.

Butchers of Maysville, Ky., are considering the erection of an abattoir. R. M. Allen, Kentucky Experiment Station, Lexington, Ky., may be addressed for details.

In connection with a convention of the Oil Mill Superintendents' Association in Memphis, Tenn., June 12-14, manufacturers of oil machinery and accessories will have an extensive exhibition of their products. Among the Memphis concerns which will have exhibits are the Reed-Duecker Company, the Tri-State Engineering Company, the Chickasaw Iron Works, the Livermore Foundry & Iron Works, the Crane Company, the Allen Engineering Company, the Townes Company and the W. R. Peete Company.

H. D. Fitch, Bowling Green, Ky., manager of the Kentucky Public Service Company, has announced that a new gas plant with a generating capacity of 200,000 ft. a day will be installed at once. A gas holder of large capacity will also be erected. The cost of the improvements will be \$60,000. The company will install a pumping station to be used in connection with its electric light plant.

The Consolidated Stone Company, Bedford and Bloomington, Ind., has purchased the mill of the Dugan Cut Stone Company at Bedford, and will install additional machinery at a cost of \$10,000.

B. F. Sewell has applied for a franchise to operate a gas plant at Johnson City, Tenn. The cost of the proposed plant will be \$100,000. Mr. Sewell is said to represent London capital.

Houston & Liggett, Lewisburg, Tenn., have acquired a factory building at Columbia, Tenn., and are arranging for the installation of woodworking equipment for the manufacture of cedar pencil slabs. The plant is expected to be in operation within 30 days.

The Caraway Mfg. Company, Nashville, Tenn., will erect a woodworking plant in that city at a cost of \$20,000. Handles, spokes and other vehicle stock will be manufactured.

The Commercial Club of Morristown, Tenn., has in charge plans for the location of a hydro-electric power plant with the end in view of operating an interurban traction line in eastern Tennessee. The attraction of new factories is also one of the objects.

Marr & Holman, Nashville, Tenn., architects, will let a contract for the installation of two electric elevators in the building occupied by Charles Mitchell on Union street, in that city.

Yates, Brown & Yates, Paris, Tenn., have purchased a tract of timber near Springville, Tenn., and will erect a sawmill in the immediate future for its manufacture. Otway Yates is manager.

The Lillian Knitting Mill Company, Albemarle, N. C., is in the market for a steam heating plant to be install in an addition to its factory, which is now being erected.

The Consolidated Lumber Company, Indianapolis, Ind., will erect a large saw and planing mill at Georgetown, Miss., at a cost of \$60,000. J. E. Borden is in charge of the erection of the mill.

It is reported that the Roth Packing Company, Cincinnati, O., will erect a factory at Chattanooga, Tenn., on the site of the plant of the Consignees' Favorite Box Company, which was recently destroyed by



fire. The property is now controlled by the Acme Box Company, of Chattanooga.

The Alfalfa Milling Company, West Point, Miss., has been organized to equip and operate a mill for manufacturing stock feed.

The Southern Lumber & Timber Company, Hillsdale, Miss., R. Batson president, has bought 10,000 acres of timber land and will extend its operations and its mill capacity.

## Birmingham

BIRMINGHAM, ALA., June 3, 1912.

A generally fair demand exists for machine tools and there is some activity in that quarter. There is also a fair movement in machinery supplies. The engine and boiler lines and pumps are inclined to remain quiet. Sawmills have become more active since the advance in the prices of lumber and are doing more buying, especially machinery supplies. The machinery market as a whole is holding its own on practically the same level as has existed for two weeks. Shipments are easy in all Southern territory. The trade is better than it was at the same time last year, and dealers express confidence in the outlook.

Materials for the shops of the Georgia, Florida & Alabama Railway at Bainbridge, Ga., which were burned some time ago, have been gathered for rebuilding. The W. T. Jay Company, Shellman, Ga., has the contract.

The Alabama Power & Development Company, Talladega, Ala., reports near completion of power plant on Coosa River, at Jackson Shoals. It proposes to furnish power to Talladega, Gadsden, Fort Payne and other towns.

Carthage, N. C., will install a \$50,000 waterworks and sewer system. The J. B. McCrary Company, Atlanta, Ga., has the plans.

Chase City, Va., will install a \$50,000 waterworks and sewerage system.

Buford, Ga., has plans for a \$15,000 waterworks and lighting plant.

Augusta, Ga., will vote on June 24 on the issuance of \$150,000 of waterworks improvement bonds and \$1,000,000 of bonds for construction of river levee.

Cartersville, Ga., has voted \$50,000 of bonds for extension of public utilities plants.

Straiton Bros., Greensboro, Ala., will rebuild woodworking plant recently burned.

J. E. Felton & Sons will replace their planing mill recently burned at Prattville, Ala.

Callaway Lumber & Mfg. Company, Milledgeville, Ga., will build blind, door and sash factory.

Marietta, Ga., will build a \$20,000 power and lighting plant.

The Wiley Candy Company, Atlanta, Ga., will build a factory in Birmingham. John L. Parker, of Birmingham, is president of the Birmingham concern.

The Hilliard Canning Company, Hilliard, Fla., has been incorporated with a capital stock of \$5,000. C. H. Trott is secretary.

Frank Lanier and others will erect a \$50,000 light and power plant at Americus, Ga. The J. B. McCrary Company, Atlanta, has prepared the plans.

Bowdon, Ga., has plans for erecting \$20,000 water works and lighting plant. The J. B. McCrary Company, Atlanta, has the plans.

Vidalia, Va., will spend \$50,000 installing sewerage system, improving waterworks and lighting plant, etc. The J. B. McCrary Company, Atlanta, has the plans.

The Birmingham Metal Product Company, Birmingham, Ala., will build its own plant for the manufacture of spiral culverts, etc. It has heretofore leased a plant.

The Central Coal Company will expend \$100,000 in new tipples, electric and undercutting equipment and new haulage system in mines at Warrior.

The Madrid Cotton Oil Company, Madrid, Ala., proposes to build cotton seed oil, corn meal and corn products mill. Its capital stock is \$20,000.

W. B. Gravlee, of Newtonville, Ala., is president of the newly-incorporated Gravlee Coal Company, with mines at Dora, Ala. Its capital stock is \$10,000.

Newborn Gin Company, Newborn, Ga., will erect a gin. J. W. Pitts is president. Its capital stock is \$15,000.

The Rome Lime & Fertilizer Company, Rome, Ga., with a capital stock of \$10,000, has been incorporated.

The Potter Palmer Estate of Chicago has taken over the plant of the Caddo Window Glass Company at Shreveport, La., and will enlarge it, increasing its equipment extensively.

The Fulton Mfg. Company, Fulton, Ky., has completed arrangements for the establishment of a factory at Shreveport, La., for the production of stirrups and saddle forms.

The Virginia-Carolina Chemical Company has let a contract to Hugger Bros., Birmingham, to build a sulphuric acid plant at Shreveport, La., at a cost of \$150,000. It will be a four-chamber plant, five stories.

A typographical error was made in the statement in this column last week concerning the Woodward Iron Company's new impounding reservoir. Its capacity will be 200,000,000 gals.

## St. Louis

ST. LOUIS, MO., June 3, 1912.

Although business has seemed rather quiet in recent weeks, the casting up of the May totals shows generally a better month in the aggregate than has been the case since the first of the year in the machine tool market. Apparently, therefore, the single tool business has been a very satisfactory thing. The chief interest of the week was in a list from the Missouri & North Arkansas Railroad for a number of tools for its machine shops. It is a large one, in comparison with the recent past, but rather small in the light of the "days before the panic," which has come to be the date to compare by. The Diesel Engine Company's list has not been closed yet and there is no reason for haste as the construction work on the plant is not so far advanced as to make the purchase of the machinery vital. The Wabash receivers have had to do some close figuring on their machine tool lists and in consequence the anticipated purchases have not materialized to any extent. Collections continue fair and dealers are having very little trouble in this direction.

The Paper Pulp Mfg. Company, St. Louis, has been incorporated, with a nominal capital stock of \$5,000, for the establishment of a pulp manufacturing plant. The incorporators are George F. and Eugene C. Tittman and William F. Heidemann.

The New Standard Adding Machine Company, St. Louis, has been organized with \$300,000 capital stock, to re-equip and operate the plant of the Standard Adding Machine Company, recently purchased at trustee sale for \$100,000 by E. A. Grant of Cleveland, O. The new incorporators are H. L. Cornet, F. B. Call of St. Louis; F. M. Call, Chelsea, Okla.; R. H. Housling and R. A. Edwards of Peru, Ind., in addition to Mr. Grant.

L. E. Fisher, formerly a general superintendent of the Illinois Traction System, has bought a large coal land acreage between Belleville and Millstadt and Smithton, Ill., and will develop it at once.

The St. Louis Country Electric Light, Heat & Power Company has been incorporated, with \$150,000 capital stock, by David P. Leahy, Philip A. Smith, Richard J. Baldwin and Stephen J. Leahy, to equip a plant to supply Jennings and Woodland, Mo., suburbs of St. Louis. The incorporators are all of St. Louis.

The St. Clair Hosiery Mills, with Curt J. Vogel as general manager, has completed arrangements, under the incorporation recently noted, to establish a mill in a new building at Belleville, Ill.

The Blanke-Wennecker Candy Company has completed arrangements for the construction of a large and new plant at Seventeenth and Pine streets, St. Louis.

The Mississippi River Power Distribution Company, which will handle the electric current of the hydroelectric plant at Keokuk, Ia., has completed its plans for the construction and equipment of a transformer station on the edge of the St. Louis city limits. The work will be done without the intervention of a contractor and under the direction of General Manager C. S. Ruffner. Two buildings, 60 x 200 and 60 x 140 ft. will house the equipment.

The Staudte & Rueckholdt Mfg. Company, St. Louis, operating a large woodworking plant for interior fittings, has increased its capital stock by \$20,000 for the purpose of adding new equipment.

The Ad Pencil Company, Kansas City, Mo., has been incorporated, with \$50,000 capital stock, by J. B. Scott, A. H. Cole, E. Dorn, C. S. Cryslar and W. H. Cloney to equip and operate a pencil manufacturing plant.

The Valentine Mining Company, Joplin, Mo., has been incorporated with \$50,000 capital stock by H. O. Neff, H. W. Hazell, E. Swearingen, J. H. Taylor, W. F. Boline, Jr., J. B. Greene and J. S. Seeley, to equip and operate mining property owned by them.

The Holmes Disappearing Bed Company, St. Louis, has been organized with \$25,000 capital stock by O. S. Hurd, P. R. North, G. A. Hurd and W. W. North to equip a plant for the manufacture of a patented bed.

The M. & M. Mining Company, Joplin, Mo., has been incorporated with \$15,000 capital stock by W. J. Van Borries, Mercer Arnold, F. S. Higgins, and others, to equip and operate mining property owned by the stockholders.

The Hoffman Box Company, Kansas City, Mo., proposes building a branch factory at Dallas, Tex.

The Breslin Boiler Works, Fort Smith, Ark., is about to build and equip a boiler shop 130 x 140 ft. at an aggregate cost of about \$65,000.

The Minneapolis Creosoted Block Mfg. Company has arranged for the building of a factory at Fort Smith, Ark., with a capacity of 1,500,000 ft. of lumber per month and to cost about \$50,000.

The Norfolk Electric Light & Power Company, Norfolk, Neb., announces its intention to spend \$35,000 in improvements, of which \$20,000 will be for a new power house.

The St. Joseph Street Railway, Light, Heat & Power Company, St. Joseph, Mo., plans to spend in the neighborhood of \$100,000 for the enlargement of its power facilities. The plans include the installation of a 4,000-hp. turbo generator with suitable boiler capacity.

## Texas

AUSTIN, TEXAS, June 1, 1912.

An era of interurban electric railway construction and general electrical development seems to have been recently inaugurated in this State. Besides the several projects for connecting different towns in northern Texas there is much activity in the installation of lighting and power plants and in enlarging and improving existing concerns of this kind. Dallas is already rapidly becoming an interurban center of much importance. There are also projects on foot which promise developments of this character in some sections of southern Texas. Steps are being taken to revive the project of constructing a line between Fort Worth and Mineral Wells, a distance of about 70 miles. It is announced that the Mercantile Trust Company of St. Louis has agreed to finance the project and that the company which will construct and operate the road will be composed of St. Louis and Fort Worth men.

The San Antonio Traction Company will install a 3000 kw. generator and the necessary transformers and other machinery in station B of its power plant at San Antonio.

John J. Conway of Mission, Texas, has acquired 7400 acres of land adjoining the large irrigated tract which he owns near that place and will soon begin the construction of a system of irrigation, including the installation of a large pumping plant. The site of the proposed plant is near that of the Mission Land & Irrigation Company.

The Burge Mfg. Company has been formed at Houston with a capital stock of \$20,000 for the purpose of manufacturing furniture. The incorporators are R. A. Burge, C. H. Myers and C. D. Woodburn.

The Farmers' Independent Gin Company has been organized at Mission with a capital stock of \$125,000. The incorporators are M. Cartwright, T. M. Melden and Fred W. Volz.

The National Lumber & Creosoting Company, Texarkana, has adopted plans for a creosoting plant which it will install at Houston at a cost of between \$150,000 and \$200,000, to treat all kinds of timber and make creosoted pine blocks for street paving purposes.

W. C. Shaw and associates, who recently purchased the sugar mill of the San Benito Sugar Mfg. Company at San Benito, will enlarge the plant to 1500 tons daily capacity.

Samuel Speers of San Benito and associates, who recently purchased 987 acres of land near there, will install an irrigation pumping plant.

The Memphis Oil & Gas Company has been organized with a capital stock of \$40,000 for the purpose of drilling oil wells near Memphis, Texas. The incorporators are J. M. Elliott, W. H. Wallace, J. W. Greenwood and others.

The Texas Power & Light Company, which recently completed its organization, has a capital stock of \$13,000,000, and its principal office is in Waco. Besides taking over the franchises and other holdings of the electric light, power and gas companies of Waco, Waxahatchie, Cleburne, Hillsboro, Sherman, Bonham and Temple the new company has acquired the holdings of the Southern Traction Company, which is constructing an interurban electric railroad between Dallas and

Waco. It will make many improvements to the different plants which are embraced in the merger, and will also install at Waco an electric power plant at a cost of about \$800,000.

It is reported that the American Lumber Company will erect a large lumber mill at Orange, Texas.

Taxpayers of Madisonville are circulating a petition asking the City Council to order an election to vote on the proposition of issuing \$20,000 of bonds for the installation of an electric light plant and system of waterworks.

The Southwestern States Corporation, which recently took over the landed holdings of the Burton D. Hurd Land Company near Collegeport, will install a large irrigation pumping plant. Its plans also call for the erection of cotton gins, a rice mill and a canning factory.

The Missouri, Kansas & Texas Railway Company has awarded a contract for grading and filling in all its property in East Waco, where its roundhouse and terminal facilities are to be located. It will expend in this and other improvements in East Waco more than \$300,000.

The Little Indiana Canal Company will install a new pump in order to provide additional water for irrigating its large tract of land near Brownsville.

Dr. F. S. Pearson of New York and associates, who own the Medina Valley Irrigation Company, which is expending approximately \$8,000,000 in the construction of a system of irrigation near San Antonio, will also establish a large cotton mill and cotton seed oil mills when the land is brought under cultivation.

John C. Keyes, Oklahoma City, Okla., has purchased the Artesia Electric Light & Power Company at Artesia, N. M. It is planned to enlarge the plant and construct electric power transmission lines to the farms of that section.

The Artesia Canning Company will soon begin the erection of a factory at Artesia, N. M. J. D. H. Reed is manager.

The Globe Cement & Construction Company will move its cement, brick and block works from Globe to Miami, Ariz. It will also install a steam curing plant in connection with the industry.

The Lawton Railway & Lighting Company, which was recently organized with a capital stock of \$500,000, has been granted a franchise for the construction of a street railroad system and the installation of an electric light and power plant at Lawton, Okla. It is its purpose to construct an electric line between Lawton and Fort Sill.

Rafael Moreno has been granted a concession by the Department of Fomento of the Mexican Government to exploit the salt deposits at Navidad, Jalisco. He will install machinery for the work.

## The Pacific Coast

PORTLAND, ORE., May 28, 1912.

The Oregon Short Line has sent out a large list comprising about 30 machine tools. This is the best inquiry received in many months, but is about the only notable feature of the market. Few orders recently placed call for more than two or three tools, and these mainly of the smaller types, while there is some complaint of low prices.

Activity in other classes of machinery is well maintained, with orders and inquiries from all classes of manufacturing plants. Woodworking machinery, including logging, mill and box factory equipment, is as usual the leading factor, and the outlook is encouraging, lumber shipments from Columbia River, Puget Sound and Gray's Harbor being unusually large. General equipment for large construction work is receiving more attention, several large railroad contracts having been let recently, while others are practically in sight. Considerable business is expected from pulp and paper manufacturers, and contracts are coming out on several hydroelectric projects.

The port of Portland is taking figures on a compound marine engine, 8x17x12 in., for 225 lbs. working pressure.

The Spokane, Wash., Ornamental Iron Company has completed plans for a large addition to its plant.

The Ferro Machine & Foundry Company, Cleveland, O., has placed an agency with the Pacific Net & Twine Company, Seattle, Wash., for the distribution of its gas engines in the Puget Sound district.

It is reported that the Astoria Iron Works, Astoria, Ore., will shortly start a gas engine plant at Seattle, Wash.



The C. E. Smith Lumber Company has placed a contract with Charles C. Moore & Co., San Francisco, for the installation of an electric power plant in connection with its mill at Marshfield, Ore. Two General Electric turbines, one 2000 kw. and one 500 kw., will be installed. This company is preparing to go ahead with its pulp mill project at once.

The Powell River, B. C., Pulp & Paper Company, which recently started operations in its new plant, is said to be in the market for two additional paper machines.

It is reported that the Haybrook Lumber Company's mill near Everett, Wash., which was burned recently, will be rebuilt at once.

The Consumers' Lumber & Supply Company, Henry Folz, president, has arranged to purchase a factory site at Burlington Harbor, Ore., and will put up a sawmill of 200,000 ft. daily capacity.

The American Falls Power Company, American Falls, Idaho, has let a contract to the James A. Green Company for the erection of a power house at a cost of about \$250,000.

The Minnehaha Gold, Hydraulic & Dredge Company, operating near Ashland, Ore., proposes to build a dredge to cost about \$50,000.

It is announced that the Ford Motor Car Company will build a large shop and assembling plant at East Eleventh and Division streets, this city.

The Pine Box & Lumber Company, C. E. Lum president, is preparing to install a lumber mill and box factory in the Cascade mountains near North Yakima, Wash.

The Stimson Mill Company, Seattle, Wash., is installing a large turbine electric generator in its power plant.

Stone & Webster have placed an order with the Willamette Iron & Steel Works for an electric hoisting outfit to handle cars on a long 75 per cent. grade. Except for motive power, the machine is similar to that built recently for the Yosemite Lumber Company of California.

The Ferrofix Brazing & Machine Works, Seattle, Wash., is making a specialty of portable oxy-acetylene welding outfits for use in logging camps, etc.

The S. B. Hicks Wire Rope Company, Kent, Wash., is preparing to enlarge its plant, and will put in several wire rope machines of its own design.

The Anaheim Union Water Company, Anaheim, Cal., has placed an order with the Byron Jackson Iron Works for a large vertical pumping plant.

The Sperry Flour Company is preparing to make an addition to its mill at San Luis Obispo, Cal.

The San Diego & Southwestern Railroad has decided to locate its shops at San Diego, Cal.

The Great Western Power Company will shortly add a 20,000-kw. unit to its hydroelectric plant on Feather River.

The Inter-Island Steamship Company, Honolulu, T. H., is preparing plans for a floating dry dock of 9000 tons capacity.

The Collins-McCarthy Candy Company, this city, has leased a building to be erected on Beale street and proposes to install one of the largest candy manufacturing plants west of Chicago.

## Eastern Canada

TORONTO, Ont., June 3, 1912.

The best account of the state of the manufacturing industry in Canada at the present time is given in the address delivered at the recent annual meeting of the Imperial Bank of Canada by its president, D. R. Wilkie. He said in part:

We have from all sides most satisfactory reports on the condition of manufacturing industries. Many factories are working overtime—in fact, we have not one report that is not encouraging. The exportation of manufactured goods is increasing, and with increased capacity of railroads, additional harbor facilities, and the opening up of new markets, our manufacturers should soon be able to give the consumer in Canada the benefit of the lower cost of production. I must make one exception, however, in speaking of the prosperity of manufacturers. The lumber producers, particularly in British Columbia, have had to contend, through, some say, the laxity of customs officials, with importations of American lumber free of duty upon which duties should have been collected. This has since been remedied, and our latest reports indicate a turn in the tide, and with every prospect of a good harvest and increasing immigration our lumbermen and sawmillers are looking forward with confidence to a profitable season.

The improvements to be carried out at the western extremity of Montreal's harbor basin will cost from \$1,500,000 to \$2,000,000.

The Whitman-Barnes Mfg. Company, St. Catharines, Ont., will spend \$35,000 on extensions to its plant. The forge shop will be greatly enlarged, and two new buildings will be added.

The Fort William Coal Dock Company, Fort William, Ont., has given the Brown Hoist Company, Cleveland, the contract for improvements to its plant that will cost \$250,000.

It is stated that the Nova Scotia Steel & Coal Company is contemplating the construction of a car manufacturing plant at New Glasgow.

The Sanitary Can Company, whose Canadian branch plant is located at Centre, Ont., has under consideration plans for a large addition to be built which will involve an expenditure of \$60,000 and will more than double the output of the present plant.

The Dominion Government is calling for tenders for the construction of a dock at the port of Quebec to cost \$1,000,000. It is to be constructed on the St. Charles River. The work on the new dock will be commenced just as soon as is possible.

Departing from the original plans, the management of the Casey-Cobalt Mine, in New Liskeard, Ont., will install a 10-stamp mill on its property instead of a 5-stamp plant.

Work has begun on the new foundry and machine shop of the Marsh & Henthorn Company, Belleville, Ont. The new buildings will cost upward of \$50,000.

The International Harvester Company will build a \$35,000 addition to its plant at Hamilton, Ont.

The Canadian Steel Foundries, by the middle of the month, will be in a position to double its present output. The new \$1,000,000 plant at Longe Pointe, Montreal, will commence turning out steel castings shortly. It will have a capacity of 2,000 tons of finished steel castings a month, or 25,000 tons a year. At present, the two plants at Pointe St. Charles and Weiland, Ont., have only a joint capacity of 2,000 tons.

The by-law carried in Colborne, Ont., grants to the Canada-Ohio Motor Car Company a free site and exemption from municipal taxation for a period of 10 years. The company will forthwith begin the erection of a factory building 60 x 400 ft., in which to manufacture automobiles.

The two sawmills of Granes, Bijwood & Co., at Byng Inlet, Ont., were destroyed by fire on May 20. They were among the finest in Canada.

The Canadian Shovel Company, Hamilton, Ont., has factory extensions in hand to cost \$12,000.

The Renfrew Woolen Mills Company, Renfrew, Ont., is making extensions and putting in new machinery.

The Canadian Drawn Steel Company, Hamilton, Ont., is making an extension to its factory.

The Canadian Meter Company, Hamilton, Ont., is adding to its factory capacity.

The Carbet Company, Owen Sound, Ont., is making an extension to its plant.

The Electrical Specialties Company, London, Ont., is building a factory to cost \$25,000.

The F. S. Simms Company, St. John, N. B., is building a factory.

The Northwest Steamship Company is placing an order with the Western Dry Dock Shipbuilding Company, Port Arthur, Ont., for a large bulk freight vessel.

The by-law embodying the agreement between the City Council of Port Arthur, Ont., and the Canadian Car & Foundry Company for the establishing of large car works in that city was approved by the ratepayers.

The Adams Wagon Works Company, Brantford, Ont., has just completed two important extensions at the plant, one to the wood-working department and one to the blacksmith shop. Announcement is made that a large extension, 75 x 185 ft., will at once be made to the present paint shop on the north end. In addition, the present offices of the company will be converted into factory departments, and entirely new offices built.

The Otis-Fensom Elevator Company is making a \$30,000 addition to its factory in Hamilton, Ont.

The American Hat Frame Mfg. Company, Toronto, is building a warehouse to cost \$25,000.

The Dominion Wire Mfg. Company, Ottawa, is putting up a factory to cost \$20,000.

The Diamond Flint Glass Company's factory in Hamilton, Ont., was burned. Loss \$35,000. It is to be rebuilt.

The Barber Paper & Coating Mills, Limited, has

been incorporated, with \$1,500,000 capital stock. The head office is to be in Toronto.

The Canadian Brick Company, Ltd., Toronto, has been incorporated with a capital stock of \$1,000,000.

The Russell Motor Car Company, Toronto, is about to commence the erection of a four-story addition to its plant, at a cost of \$100,000.

M. Laren & Co., 65 Cumberland avenue, Toronto, has been awarded the contract for the construction of sewage disposal works at the House of Refuge, Cobourg, Ont., to be built from plants of T. Aird Murray, Toronto.

Plans are prepared by the Steel Castings Company, Hamilton, Ont., for an extensive plant to be erected in that city. C. W. Sherman, 189 Cleveland avenue, Buffalo, N. Y., is general manager of the company.

The Canadian Moorehead Mfg. Company, Ltd., Woodstock, Ont., has been incorporated with a capital stock of \$25,000, to manufacture steam appliances. George H. King, George W. Cole and A. S. Belcher are provisional directors.

The H. Barnard Company, Ltd., Ont., has been incorporated with a capital stock of \$40,000, and will build and equip a factory for the manufacture of steel stamps and other marking devices. The directors are H. M. A. and E. H. Barnard.

## Western Canada

WINNIPEG, Man., May 30, 1912.

There is a heavy movement of machinery for the various Western industries. The local houses dealing in these lines are doing a much larger volume of business than at the corresponding time last year, and numerous shipments pass through from both the East and the South. The comparatively few western Canada foundries or factories have practically all the business they can handle. There are not very many announcements this week of new works to be started, but the trade is actively engaged on concerns previously reported. The Winnipeg building inspector estimates that the total amount of building permits in this city for 1912 will reach \$20,000,000, and the calculation is chiefly based on the large number of big mercantile structures to be erected. Office buildings, in particular, will absorb a great deal of heating machinery, elevators and other requirements.

The Maple Leaf Milling Company, Ltd., Brandon, Man., announces that it will build an elevator of 120,000 bushels capacity to replace the one burned recently.

The Big Four Milling Company, of Sheldon, Ia., suffered a loss last week of its mill at Millwood, Man., as a result of the breaking of a dam. The machinery was badly damaged. The new owners have representatives on the ground already preparing to rebuild the plant and install new machinery, with larger capacity than the old one.

The Western Canada Cold Storage & Packing Company, Ltd., has been incorporated under Dominion charter, with capital stock of \$500,000, to take over the plant of the Central Canada Packing Company at Medicine Hat, Alberta. The packing plant is in fairly good condition and cold storage machinery and piping will be installed in the near future.

The Calgary Malting Company, Ltd., Calgary, Alberta, has let a contract to the Canadian Stewart Company for the erection there of an elevator of 500,000 bushels capacity.

The power plant of the city of Moose Jaw, Sask., burned a few days ago with a loss of between \$350,000 and \$400,000, the large pump being destroyed also. The citizens will at once go about replacing the plant. The city and its industries are greatly handicapped by the disaster.

At its annual meeting two weeks ago the Granby Consolidated Mining & Smelting Company provided for the appropriation of \$500,000 for the purpose of building a smelter at Goose Bay, Portland Canal District, B. C.

Contracts for about \$10,000 worth of brickmaking machinery, making a total of about \$50,000 to be expended by the Tregillus Clay Products Company, Calgary, Alberta, on machinery, were awarded May 27. The machinery just ordered will be for making wire-cut brick out of stiff mud. Matters in connection with the concern, which will expend in the neighborhood of \$500,000 in establishing a clay working plant, are going along prosperously.

## Government Purchases

WASHINGTON, D. C., June 3, 1912.

The Paymaster General, Navy Department, Washington, will open bids June 11, under schedule 4580, class 161, for one 100-in. boring and turning lathe.

The Paymaster General, Navy Department, Washington, will open bids June 18, under schedule 4578, class 1, for one gas-producing apparatus; schedule 4579, class 2, one electric spot welding machine; schedule 4581, class 3, for converting two Forbes pipe machines into motor-driven machines; schedule 4582, class 11, one hydraulic stanchion pipe bender.

The Bureau of Yards and Docks, Navy Department, Washington, will open bids June 22 for furnishing and installing a 35,000-gal. quadruple effect seawater distilling plant and appurtenances at the naval station, Guantanamo, Cuba.

The Constructing Quartermaster, New London, Conn., will open bids June 15 for constructing a coal-handling and storage plant, consisting of frame buildings with concrete floors, industrial railway, motors, etc., at Fort Terry, Plum Island, N. Y.

The Constructing Quartermaster, Fort Oglethorpe, Ga., will open bids June 15 for the construction of an electric lighting system at that post.

The Constructing Quartermaster, Fort McPherson, Ga., will open bids June 15 for furnishing material and constructing sewage purification plant.

The Constructing Quartermaster, Vancouver Barracks, Wash., will open bids June 15 for the removal of a turbine pump and installing a turbine pump capable of handling sand in water at 100 gal. per minute, including shafting, motor, etc.

## An Asbestos Roofing Fire Test

The fire insurance commissioner of the city of Houston, Texas, the fire marshal, and a large number of the most prominent architects and builders recently witnessed a very effective fire test of a ready roofing. A miniature house, about 7 ft. high by 6 ft. wide, was built and covered on all sides with J-M asbestos roofing. The lower part of the building was embedded 3 in. in the ground, and around three sides fire wood was placed. The fourth, or open side of the structure, was left clear.

A strong wind was blowing, and when the kindling was ignited and the fire well under way, such an intense heat developed that the crowd surrounding the house had to retreat from the sides and rear to a distance of at least 10 ft. During the test, while the flames were going all over the building, the spectators were invited to step inside the house and see how cool it was, and it actually was cool and comfortable. After the fire had been burning for 15 minutes it was extinguished. The roofing was not injured in the least, being only blackened by smoke. Then the ashes were removed, the roofing was torn off where most blackened and the boards underneath were found as fresh and in as good condition as when they had been put on, with the exception of a few spots where the natural sap of the pine had oozed out.

The J-M asbestos roofing on which this test was made is manufactured by the H. W. Johns-Manville Company, whose home office is in New York City, but has an office in Dallas, Texas. This roofing is made of pure, long-fibred asbestos felt, securely cemented with Trinidad Lake asphalt—two practically indestructible minerals.

The Strauss Bascule Bridge Company, 104 South Michigan avenue, Chicago, states that its design of bascule has recently been adopted for the following bridges: Great Northern Railroad, at Seattle, Wash., 200 ft., single leaf, double track; Northern Pacific Railroad, at Seattle, Wash., 191 ft., single leaf, single track; Houston Belt & Terminal Railroad (Santa Fé System), Houston, Texas, 111 ft. 6 in., single leaf; Wayne County, Mich., at Dix avenue, Detroit, 112 ft., single leaf.

The Wheel Truing Tool Company, Detroit, Mich., H. B. Wallace, manager, announces its removal to new and more commodious offices at 826 Ford Building in that city. As an importer with direct European connections, this company offers unusual service in supplying borts or carbon diamonds as well as adequate facilities for the manufacture and repair of wheel truing diamond tools.



## Trade Publications

**Screw Machines and Products.**—Universal Screw Machine Company, Hartford, Conn. Loose leaf catalogue. Illustrations and description matter explain the operation of the Universal five-spindle automatic screw machine. The special features of this machine are pointed out and this is followed by a description of the machine and its parts, the text being supplemented by illustrations.

**Grinding Machines.**—Heald Machine Company, Worcester, Mass. Catalogue. Size, 6 x 9 in.; pages, 115. Lists machines for internal, cylinder, surface and drill grinding, a separate section being devoted to each line. One of the special features of the internal grinders is the use of V shaped belts for driving the wheel spindles. The various types of wheel heads and wheels which can be supplied are shown and this is followed by suggestions for grinding and specifications of the machines. The cylinder grinding machines are taken up in the same way, as are also the ring and surface grinders and the various types of American drill grinding machines. A table of grinding speeds completes the catalogue.

**Turbo-Generator.**—Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Descriptive leaflet No. 2458. Illustrates the Westinghouse type T direct-current turbo-generator, consisting of a steam turbine mounted on a common base with and directly connected to a direct-current generator. A full description of the various characteristics and constructional details of the turbine is given and numerous views of the various parts, completed machines and installations are included. An illustrated description of this generator appeared in *The Iron Age*, May 2, 1912.

**Ball Bearings.**—S. K. F. Ball Bearing Company, 50 Church street, New York City. Bulletin No. 1. Explains the construction, peculiarities and particularly the provision for self-alignment of the S. K. F. radial bearing and gives dimensions, speeds and capacities of the principal types and sizes.

**Roller Bearings.**—Hyatt Roller Bearing Company, Newark, N. J. Two mailing cards. Call attention to the wide range of uses to which these bearings can be put. One of the cards shows a 17-ton sheet metal bottle measuring 20 ft. in diameter and 50 ft. high located on top of a 20-story tower in Baltimore and revolving continuously at a speed of 107 ft. per minute. The other card deals with the use of the flexible roller bearings for mine car wheels and gives a comparison of its advantages as contrasted with a roller bearing of the solid type.

**Rock Drills and Pile Hammers.**—McKiernan-Terry Drill Company, 115 Broadway, New York City. Two pamphlets. The first describes and illustrates the Wizard line of rock drills which are built in two types, one with a spool valve which is moved by fluid pressure and the other with the tappet valve which is adapted for the use of either air or steam. Specifications and lists of repair parts of both drills are included. The other bulletin is concerned with a heavy duty pile hammer which was designed and built for driving heavy steel and wood sheet piling and concrete and wooden piles. This hammer is made in three different sizes and brief specifications of all three are given. Views showing the hammer in use are included as well as a list of repair parts.

**Hoists.**—Yale & Towne Mfg. Company, 9 Murray street, New York City. Pamphlet. Contains illustrations and data selected and arranged to present all practical sizes of hoists and trolley service. Diagrams and tables show the efficiency, capacity, range, clearance, etc., and the economy possible with each type of hoist, trolley, crane, crab or winch can be readily determined from these tables. Electric hoists and motor trolleys are illustrated in use and installations for low ceilings are shown with hand and power hoists of extreme compactness. The illustrations for the most part show the best examples of large and small factories both in the United States and abroad. Complete data are given on trolley track, turn tables and two and three way switches with tables of costs.

**Oil Burning Equipment.**—Mires Oil Burning Equipment Company, Inc., Norfolk, Va. Pamphlet. Illustrates a line of oil burning equipment for forging, heating and melting purposes. The forges are arranged to accommodate miscellaneous work such as is done on the ordinary open blacksmith's coal forge and they possess the advantage of having superheating flues which gasify the oil and air before they enter the heating chamber. About half of the 42 pages is given over to illustrations of plants where these furnaces are installed.

**Refillable Cartridge Fuse Shells.**—A. F. Daum Company, Pittsburgh, Pa. Catalogue. Describes a refillable cartridge fuse shell for electric light and power circuits. A full description of the method of making these fuses, together with price list is given. The different uses for which these fuses are adapted are also referred to.

**Indicators.**—Trill Indicator Company, Corry, Pa. Booklet. Size, 6 x 9 in.; pages, 48. Besides containing a full description of the various types of indicators, reducing wheels, indicator fittings, planimeters, etc., it also includes discussions and criticisms of a number of typical indicator diagrams, instructions for drawing expansion curves and combining the cards of compound engines. The pages on indicating gas engines contain full instructions for taking

and interpreting gas-engine indicator diagrams and instructions on setting valves, etc. Much new and original information on this subject is embodied.

**Boiler Tube Cleaners.**—Lagonda Mfg. Company, Springfield, Ohio. Bulletin U. Contains a description of a new type of air or steam-driven boiler tube cleaner which was illustrated in *The Iron Age*, May 23, 1912. The cleaner is of novel design, and the arrangement of ports and passages is such that while the working paddles will receive ample air pressure, those not in operation are cut off from the air supply and leakage is thus practically eliminated. Another special feature is the ability to vary the size of the ports to meet different conditions of air or steam pressure and hardnesses and thicknesses of scale.

**Boiler Circulation.**—E. T. Copeland Company, Inc., 100 William street, New York City. Pamphlet. Describes an automatic circulating system for marine and stationary Scotch boilers. The device employed consists of two rectangular plates of steel or other metal extending from head to head of the boiler and of such a width that when in position they will extend above and below the grate level. These plates form a partition which divides the space between the furnace and the shell, so that a definite pathway is provided for water to pass up between the plate and the furnace and down between it and the shell. The special advantages claimed for this device are increased capacity, efficiency, economy and durability. A lecture on the circulation of water in steam boilers which was delivered at Cornell University is reprinted, and this is followed by a brief description of the Scotch boilers and a discussion of the artificial and mechanical circulating devices as compared with the natural and automatic ones. Line drawings showing the application of the system to one, two, three and four furnace boilers are included and serve to supplement an extended description of the system.

**Metal Punches.**—Whitney Metal Tool Company, Rockford, Ill. Loose leaf catalogue. Describes a line of all ball bearing portable rotary metal hand punches, one of which was illustrated in *The Iron Age*, March 2, 1911. These punches are designed to meet the requirements of all workers in sheet metal and structural steel and their portability is an advantage in doing repair and construction work at some distance from the shop.

**Calendar.**—Chambersburg Engineering Company, Chambersburg, Pa. Calendar hanger measuring 18 x 27 in. A special feature of the hanger is a large calendar pad commencing with June 1. This is printed from two color halftone plates and is flanked on either side by illustrations of the company's board drop hammer and steam hydraulic press, which were illustrated in *The Iron Age*, March 7 and May 2, 1912, respectively.

**Tool Steel.**—Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh, Pa. Several folders. Relate to different brands of tool steel and call special attention to the Rex AA and the various Crescent brands.

**Air Compressors.**—Gardner Governor Company, Quincy, Ill. Circular GR 1. Describes the Gardner-Rex vertical high speed compressor which is composed of but few parts, has no outside adjustments, is very simple and requires but little attention. These compressors have one and two cylinders and are arranged for belt or direct connected drive from electric motors or gasoline engines. A number of special combinations are also illustrated.

**Oil Filters, Exhaust Heads and Ventilators.**—Burt Mfg. Company, Akron, Ohio. Catalogue. Size, 6 x 9 in.; pages, 127. Describes and illustrates the various types of oil filters and filtering systems of this company, its various types of ventilators and the Burt exhaust head. One of the special features of the catalogue is the reproduction of a number of different installations of the ventilators including residences, mills, club houses, power plants, factories, etc. Among the various appliances covered are a ventilator with a motor-driven fan and improved type of pressure oil filter, both of which are illustrated in *The Iron Age*, September 28 and October 12, 1911, respectively.

**Exhaust Fans.**—B. F. Sturtevant Company, Hyde Park, Mass. Mailing card. Describes the Sturtevant slow speed low power exhaust fan which is designed to handle long or short shavings, chips, sawdust, emery, polishing dust and other refuse materials.

**Rock Drills.**—Ingersoll-Rand Company, 11 Broadway, New York City. Form No. 4016. Is descriptive of the MC-23 telescope feed hammer drill which is of the valveless type, the piston itself performing the valve functions by covering or uncovering ports that control the forward and backward movements. This tool is intended for stopping, raising and drifting to a limited extent, but is not recommended for steady work in holes at less than 20 deg. from the horizontal, because of the difficulty of cleaning them. The telescope feed is what is designated by the builder as the reversed feed in which the inner or piston tube is attached to the drill and the outer or cylinder tube runs out under pressure. The advantage of this arrangement is that the tube is stationary, not turning with the drill and the tool may be used on a tripod or column by clamping the outer feed cylinder to the mounting. Several views of the machine in section are shown and a list of duplicate parts is included.

